

# U.S.I. JOURNAL

(Established 1870)



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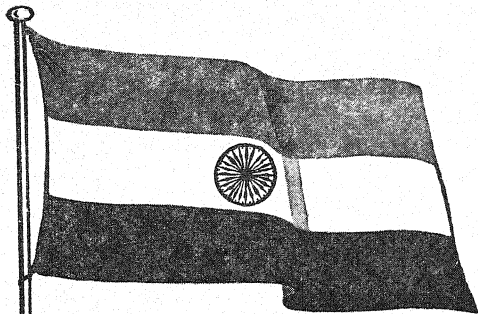
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## NOTE

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**NATIONS ARE CAPABLE OF GREAT SACRIFICES  
TO BECOME INDEPENDENT  
BUT EVEN GREATER SACRIFICES ARE NEEDED  
TO REMAIN SO**

# SIR CHARLES MACGREGOR AND THE DEFENCE OF INDIA 1857-1887

BY DR. ADRIAN PRESTON

## I

IF anyone could be claimed the father of the school for the scientific study of Indian defence policy it would undoubtedly be Sir Charles Metcalfe MacGregor. With the reopening of the Central Asian Question in the early 1860s, it became MacGregor's mission in life completely to recast the Indian defence structure and its counter-insurrectionary role to enable it to undertake large-scale offensive operations against a major European military power. Almost single-handed, he began to create the machinery within the Indian Army establishment—the special departments, professional institutes, journals and literature—to stimulate a greater awareness of the special and peculiar nature of Indian defence problems that this new role involved, and to encourage an iconoclastic re-examination of prevailing defence assumptions. From MacGregor's groundwork there was logically bound to arise a sense of Indian Army professionalism separate and distinct from that of Great Britain, and the beginnings of the belief that obligations of national defence are inseparable from nationhood. It was MacGregor who first appreciated on the basis of systematic and scientific study that India constituted a vast manpower reservoir, greater than that of Ireland and Egypt together, upon which Britain relied for the prosecution of her imperial, military and foreign policies in the East; that the North-West Frontier presented the only strategic boundary that Britain had to defend; and that the geo-strategic and demographic facts of her existence had made India potentially a great military power bound to adopt a 'Continental' military policy and defence structure in many respects parallel to those of the major European military powers. Nevertheless, there were significant differences that made the close application of European practice to Indian conditions unwise. The 'Defence of India' question was unique, and was perhaps the single most important strategic problem to confront British soldiers, statesmen and strategists throughout the nineteenth century. Unlike Europe there were no contiguous land frontiers with rival major military powers; Persia, Afghanistan, Beluchistan and China were buffer states whose co-operation and support it was the task of the political agents to win and maintain, and against whom no strategic railways could ostensibly be built. The exigencies of internal security and counter-insurgency precluded the formation of a localised Indian Army Reserve. Finally, the reinforcement and supply of British-Indian Armies and the protection of India's extensive coastline depended upon the Royal Navy and the security of its Mediterranean communications. MacGregor's exhaustive and com-

prehensive analysis of the significance of and interrelationship between all these factors in his *Defence of India* constitutes his most durable contribution to the evolution of a rational Indian defence policy. It provided for the first time a scientific system of principles of Indian defence policy from which all other assumptions and analyses could proceed.

MacGregor contributed exactly for thirty years to the defence of India. The military revolution he endeavoured to bring about was contested on many different levels and by many different interests, by the advocates of 'masterly inactivity'—those who feared a second Mutiny would result from irresponsibly committing Indian Native Armies to supporting trans-frontier operations and diplomacy and becoming embroiled in the profitless abyss of Afghan insurrection; by those who believed that the Empire's true war policy lay in the conduct of amphibious, insurrectionary and economic operations rather than in the commitment to any 'continental' strategy involving the mobilisation and manoeuvring of massive conscript armies; and by the sheer apathy and indifference of the British Parliament, Cabinet and people to Indian military affairs in general. The great bulk of MacGregor's monumental labours—the extensive personal reconnaissances, the collection, classification and collation of topographical strategic intelligence, the creation of institutes and the founding of journal—while vital and elementary to the formulation of a correct defence policy and strategy, was uninspiring and dull in the manner of most administrative enterprises, and was overshadowed by the more glamorous achievements of Roberts and Kitchener. MacGregor died prematurely in 1887, aged 47, exhausted by his largely unrequited services. Today he is remembered only by a plaque in St. Paul's Cathedral, a portrait in the United Service Institution of India, and a noble biography by his wife. It is the intention of this paper to outline the nature of MacGregor's contribution to the scientific study of Indian defence policy.

## II

Charles Metcalfe MacGregor was born on August 20, 1840, the second son of a large and variously gifted Highland family whose forbears had already contributed much to the military service in the Company's Armies. Unlike most of the great Victorian soldier-explorers MacGregor's early footsteps were guided by public schools—like Marlborough and Haileybury—before he was commissioned into the Indian Army, on October 20, 1857 and posted to the 57th Bengal Native Infantry. MacGregor was fortunate in his hour of joining the Army. Since 1838, a rash of Eastern wars had emerged against Afghanistan, Burma, Russia, Persia and China sufficiently exacting to test the military condition and resources of the Empire. More importantly, the outbreak and suppression of the Great Mutiny had compelled Britain's assumption

of the responsibility for the military government and defence policy of India, and confronted her soldiers and statesmen with a formidable military problem: how best to reduce if not entirely eliminate the chances of its recurrence. For the next generation, the need to construct a sufficiently repressive form of government and military organisation dominated Indian defence policy and trans-frontier diplomacy. The solution adopted was the establishment of a military despotism analogous to the military administration of Ireland and comparable to the great European military autocracies—Prussia, Austria and Russia. The Viceroy's official military adviser, the Commander-in-Chief, in a deliberate reversal of common constitutional procedure, sat superior to the Military Member in the Supreme Council. Known throughout India as "the great War Lord," he was responsible not only for the execution but also for the formulation of military policy, and acted for the Viceroy in his absence. The Viceroy's two unofficial advisers, the Military and Private Secretaries, always soldiers and often of no mean rank or ability, exerted, as is usual in military autocracies when relations between autocrat and official adviser break down, a direct, personal and disproportionate influence. The Members of the Supreme Council, the great Commissioners and the Lt.-Governors of the Presidencies regarded themselves as triennial or quinquennial Caesars and invested their functions—finance, famine, public works—which were technically civil, with a pseudo-military importance. The Home Council, originally intended as an interpretative and advisory extension of the Supreme Council in political and secret matters for the Secretary of State, became a staging post for Indian officers on the road to retirement and a formidable centre of conservatism and prejudice. The reconstitution of the Indian military system into mutiny-tight compartments further emphasised the peculiar features and special objectives of India's internal administration. The distinctive caste complexions of the individual Presidential Armies were so emphasised, their inferior armaments and training so maintained, the British cantonments so dispersed, the rail and road communications so constructed as to localise and suppress mutiny instantaneously and expeditiously. From 1856 to 1864, no serious thought was given to the evolution of an Indian military policy suitable for offensive warfare.

At the regimental level, where the practical difficulties of counter-insurgency would have to be met, MacGregor's experience with Hodson's and Fane's Horse during the Mutiny and China Wars convinced him of the need for radical reforms in the tactical training, organisation, dress and strategic employment of irregular cavalry. Barely nineteen years of age, he began to contribute a series of letters to the *Delhi Gazette* under the pseudonym of Ghorhar (meaning trooper of horseman), in which he argued for "some new system" of cavalry training and tactics, based

on function rather than ceremonial, to be adopted throughout the Army. He deplored the fact that there existed no Indian military paper or magazine devoted to the discussion of subjects of professional interest through which he could disseminate his views on irregular cavalry. Letters published in daily Indian newspapers did not carry much weight while those printed in British papers would probably not be read at all. Nevertheless, although he managed to secure a contract with the *Bombay Saturday Review* to write on general military subjects, it was clear that professionally something more was needed, and in July 1864 he launched the *Indian Army Review*, edited by Captain Thomson of the Invalids, and designed to provide the most comprehensive available treatment of Indian military affairs, especially during the conduct of campaigns. We cannot tell what influence this journal had upon the formulation of Indian defence policy, nor eventually what became of it. But it is clear that MacGregor intended his earliest published articles and pamphlets on irregular cavalry merely as rough notes for a definitive handbook on cavalry "in which everything should be clearly laid down, from commanding a division of that arm to putting on a bridle." As early as April 1859 he had begun collecting materials for such a study—operational histories, general orders, official despatches and "innumerable" corps records; but because most were out of print or expensive (he estimated a total cost of 7-800 rupees for 120 reference works), he calculated that it would be years before his project could be completed. His approach was otherwise thorough and scientific if a degree unorthodox. He drew up a preliminary draft outline, together with a series of detailed questions which he proposed putting to every cavalry Commanding Officer in India and then submitting for a critical review to "a committee of the best officers in the Service." He intended thoroughly inspecting the systems of cavalry of every nation of Europe to lend additional authority to his recommendations, and began personally to master every known system of equitation.

But neither this project, nor that of a *History of Cavalry in India* materialised. In 1867, the eccentric genius Sir Henry Havelock published his polemic on Indian irregular cavalry arguing, as MacGregor had intended to do, that its widespread introduction was, in the absence of railways, the simplest and most economical means of providing an effective counter-insurgency force. The following year, largely inspired by the strategic employment of irregular cavalry and mounted infantry during the American Civil War, Colonel George T. Denison, an obscure Toronto barrister and militiaman, published his great treatise on *Modern Cavalry*, a work he later rewrote as a *History of Cavalry*, submitted, significantly enough, to win the Russian Tsar's prize in 1877. Anticipated by these writings, MacGregor was moreover now actively engaged in the mountain operations of the Bhutan Field Force, an experience that was to prove

a turning-point in his career, coinciding as it did with the reopening of the Central Asian Question.

### III

By 1864, Russia's post-Crimean policy of Eastern conquest, which had begun with the systematic pacification of the Caucasus and was now enveloping Tashkent, Samarkand and the vast, vaguely defined Khanates of Central Asia seemed deliberately designed to bring her to the very outworks of fortress India. But more ominous implications for Indian defence and security had made themselves dramatically evident by the construction of a great web of strategic railways connecting Central Asia to Russia's Caucasian and European military resources, by the ever deeper scientific explorations and reconnaissances, and by Milutyn's emphasis in his army reforms upon the increased employment of irregular cavalry and upon the techniques of insurrectionary warfare and, as they would be known today, concepts of wars of liberation. Here lay the root of the British fears of a Russian threat to India. Actual invasion even by slight forces of irregular cavalry might not prove an imminent possibility, though even as to this the experts were divided. But the danger of Russian ascendancy among the Afghans, of border raids on the North-West Frontier, of sparks being thrown into the combustible material of northern India, of some Afghan attack perhaps stiffened by Russian detachments, arms and money and followed by a penetration into the Plains of Punjab and a widespread revolt—the danger of ignition or explosion, rather than of direct invasion of India: this was the core of British apprehensions, the nub of the strategic problem that now increasingly until 1975 was to confront the makers of Indian defence policy in Whitehall and Simla, the crucial justification of the Second Afghan War.

Then, as now, the construction of a rational defence policy was complicated by the political circumstances of the sovereign buffer states. It had to be decided what kind or degree of intervention, control or influence should be established within them, or whether, in the long view and considering the protracted nature of Oriental guerrilla warfare, it was wise or practicable to interfere at all. In this context it had to be decided what constituted a vital strategic point and which of these were to be defended. On all these points, there was fundamental disagreement. Discussion tended to follow two broad patterns. There was on the one hand the appeasement-like policy of 'masterly inactivity' officially enunciated by Lawrence in 1868 and largely applied by his successors Mayo and Northbrook, which argued that since all threats were distant and chimerical, internal military consolidation and a refusal to engage in trans-frontier diplomacy were the wisest principles along which Indian defence policy could be directed. But the continuing compartmental-

lised structure of Indian military government, the multiple responsibility for its policy, the defensive character of its strategy, and the marked aversion to abandon all this in favour of contemporary Continental experience, the withdrawal of the Political Agents, the active discouragement of military exploration and the absence of military attaches at St. Petersburg, Tehran and Kabul implicit in this policy also created conditions potentially disastrous to India's capacity to defend herself. So long as this mentality prevailed, the positive alienation of the buffer states caught as they were between two convergent military empires, was bound to succeed a process of disengagement thereby not only depriving India of her only means of intelligence and possible auxiliary means of military support but also providing Russia with a closer secure base from which to launch her revolutionary warfare. A centrally-directed strategy and organisation capable of rapid expansion and flexible response, and the systematic exploration and acquisition of military intelligence were incapable of development and severely restricted India's ability effectively to wage offensive warfare. Mindful of the special nature and imminence of the Russian threat, it was the objective of the opposing school of Indian defence policy commonly known as the forward, to reverse these tendencies and repair these deficiencies. MacGregor's role in resolving this conflict of policy in favour of the latter was significant and probably decisive.

MacGregor's experiences of mountain warfare in the Bhutan campaign had moved him to publish in 1866 a treatise on *Mountain Warfare: An Essay on the Conduct of Military Operation in Mountainous Countries*. Written with a view to facilitating his promotion in subsequent mountain campaigns, it unwittingly possessed a much greater intrinsic significance. Drawing heavily upon Napoleon's Italian Campaign, it is difficult to resist the conclusion that MacGregor had not modelled his arguments closely upon those of Bourcet and Guibert. It anticipated Hamley in its lucidity of style and its scholarly approach to strategical problems. It was the first book on the theory of mountain warfare under the new conditions of Russian imperial aggrandisement and the Prussian system of war. But it was more than a corrective manual of mountain tactics drawn out of the blunders of the First Afghan War.

MacGregor believed that the best method of defending a mountain frontier consisted of a defensive-strategy and the most vulnerable objective points in offensive trans-frontier operations were the enemy's capital, fortresses or strategic positions, celebrated defiles, shrines of peculiar sanctity or the concentrated hostile armies. His principles of war followed a classic pattern: operating against enemy lines of communication while jealous of all attempts of the enemy to do the same; turning rather than attacking positions; elastic dispersion while manoeuvring but sudden concentration in attack; maintenance of the offensive



and initiative; constant growth and exploitation of mobility, intelligence and surprise; and a compact central defensive position allowing daring counter-strokes along interior lines. MacGregor's emphasis upon the need for good commanders, for insuring the prior neutrality or assistance of neighbouring states for a detailed intelligence report of the prospective theatre of war (its topography, the military reputation of its chieftains, the military character of the enemy, their peculiar methods of war, morale, fighting conditions and financial resources) and for inducing the enemy to divide himself both politically and strategically implied a radical reappraisal of prevailing Indian frontier defence policy. Indeed, the few concise pages of MacGregor's brief essay had boldly sketched out a revolutionary philosophy of Indian defence policy that a decade later was to be incorporated almost entirely into Lord Lytton's reform program.

Although MacGregor's essay could not have achieved a very wide circulation, it was probably responsible for his appointment in 1865 as Officiating D.A.Q.M.G. on the North-East Frontier. His chief task, and one that had been 'absurdly' neglected by his predecessors, in procuring military and topographical intelligence about potential border enemies revived a strong predilection that had been evident in his earliest regimental days, and set him on the road to creating the modern Indian Army Intelligence Department. After the Abyssinian War, which he served with the Pioneer Force, he was promoted A.Q.M.G. at Army headquarters; and it was in this capacity for the next seven years, from 1868 to 1875, that he was to accomplish his most important work in laying the practical foundations for the rapid and smooth implementation of a scientifically constructed defence policy should that ever prove politically desirable or acceptable. MacGregor's initiatives took him into many undeveloped but closely interrelated areas of Indian military and frontier policy.

The grave deficiencies revealed by the Abyssinian War in India's capacity to conduct efficiently and economically a major war beyond her own borders stood in startling contrast to the revolutionary display of Prussian military organisation and frontier strategy in the great wars of German unification, and to the post-Crimean reform movement that was growing to a head in England. Mindful of the pattern of unchecked Russian expansionism in Central Asia, the almost Chinese character of Indian defence policy—jealously protective of the curtain between India and the outer world, yet wishing to exercise no influence beyond it—and of the close parallels that could be drawn between India's and Prussia's respective frontier defence policies and strategic problems, both Sir William Mansfield, the Commander-in-Chief, and Sir Henry Durand, the Military Member, strongly urged a closer but uncritical approximation of Indian defence to Prussian methods, strategies and organisation. In particular, they recommended the abolition of the Presidential Armies

and their amalgamation into four Army Corps under a single War Minister, and the creation of a single frontier province from Kashmir to Karachi under a supreme Frontier Commissioner charged with the conduct of trans-frontier diplomacy and military operations and directly responsible to the Viceroy. As Durand's son-in-law, MacGregor indentified himself with these proposals, submitting to the Military Department numerous memoranda on how best they could be effected. But against the immovable advocates of masterly inactivity, these efforts proved futile.

Elsewhere, he met a wider measure of success. In 1868, he was commissioned to compile the *Central Asian Gazetteer*, a huge six-volume collection of statistics concerning the topographical and strategical condition of the North-West Frontier and the border states beyond that took over five years to complete. Through his unofficial reconnaissances into North Persia, Khorassan, Baluchistan and Afghanistan which this compilation involved—all undertaken at the risk of personal injury and official displeasure and disavowal—he inspired by example more than anything else the formation of a school of military explorers and through his vast accumulated knowledge of Central Asian topography created the working basis of an intelligence department, anticipated the functions of a General Staff, stiffened the arguments of those who believed that Russian Cossacks could reach the borders of India and made possible the conception of a realistic strategic plan and defence policy that he himself was to elaborate so exhaustively in his *Defence of India* sixteen years later. MacGregor moreover recognised that the need for greater professional awareness and a study of Indian defence problems was growing with every Russian advance, and that only by mobilising and focussing the best brain-power in the Indian Army, and providing adequate machinery for the constant interchange of ideas between soliders, political agents, officials and government servants, could Indian defence policy be rationally evolved and responsibly conducted. He proposed several schemes for setting up associations for the publication of important military works and for the widespread introduction of military libraries. After publishing his pamphlet on mountain warfare, he finally conceived the idea of founding the United Service Institution of India along the lines of the R.U.S.I. in Whitehall. Since 1831, the R.U.S.I. had been consistently the most enlightened citadal and forum for the study, discussion and debate of Service and defence problems between active and retired officers, civil servants, ministerial officials and journalists. Its special lecturers and prize essays had often in the past had a not inconsiderable influence upon the formulation—or at least the rational definition and analysis—of defence policy. Its *Journal* was one of the most authoritative of its kind in the world. That MacGregor hoped to develop similar advantages, and concentrate professional in-

terest upon the most urgent issues of the day was revealed in the subject of the first *Durand Medal Essay* (named after Sir Henry Durand who had died in 1870)—the need for an Intelligence Department. Nevertheless, it was clear that any fundamental review of Indian defence policy and organisation could only result from the highest political initiatives or from the external compulsions of a war crisis.

The appointment in 1872 of Lord Northbrook as Viceroy and his nephew, Captain Evelyn Baring (later Lord Cromer) as Military Secretary seemed therefore significantly auspicious. Both had been closely associated with Cardwell's reforms and were critical students of Prussian military institutions. Northbrook had an extensive experience as a military administrator and before Mayo's assassination had presided over two key committees: one dealing with the application of the Concepts of localisation and of an Army—Corps system to the special peculiarities of Britain's small, volunteer and short-service army, and the other which recommended the creation of a formal and full-fledged Intelligence Department. Baring had served for many years as Private Secretary to Sir Henry Storks, Surveyor-General in Cardwells' administration and one of his ablest bureaucrats. He had made a special study of the Prussian staff system. Northbrook had a high opinion of him as a strategist, and it was chiefly in this advisory capacity the Baring accompanied him to India. There was every reason therefore to expect a vigorous re-appraisal of Indian defence policy and organisation, and events were now gathering in Central Asia that were to give it a decisive impulsion.

If any specific incident could be isolated as compelling a fundamental re-thinking of the implications of India's defence posture, it would undoubtedly be the Russian conquest of Khiva in 1873, and the war 'scare' it generated, with more or less intensity, for the next thirty years. It is beyond the scope of this paper to explore in depth the many complex ways in which this crisis manifested itself—manifestations which reflected a growing unease among Indian defence organisers as to the delusive inadequacies of masterly inactivity. But briefly they included the fall of Gladstone's government and Disraeli's inauguration of an aggressive foreign policy; the shifting of the centre of British strategic planning from the Low Countries to the Near East and Central Asia; and War Office contingency plans for war against Russia. Articulate soldiers, explorers and Indian officials, such as Wolseley, Baker, Goldsmid, Burnaby, Rawlinson and Frere, strongly urged a radical and massive realignment of Indian defence policy to meet the new conditions of political and insurrectionary warfare; increased, up-to-date and continuous intelligence from a network of political agents scattered throughout Central Asia; the construction of strategic railways, the occupation of Quetta and the command of the most vital passes to India; the strengthening of the Na-

tive Armies within a completely reconstructed Indian defence system; the recognition of the pivotal importance of Persia to the strategic defence of India, and the establishment of diplomatic supremacy over Kabul and South-East Asia generally. The implication for Indian defence of Russian-inspired insurrections breaking out in the Turkish Balkan provinces as a prelude to the total disintegration of the Ottoman Empire suddenly became startlingly relevant in the alarmist accounts by soldier-explorers, such as Burnaby and Baker, who had resolved, from one motive or another, to penetrate the clouds of Central Asia and bring back first-hand information concerning the true character of Russian Central Asian warfare, policy and administration. Indeed, it was the subversive nature of Russia's Central Asian conquests, spelling the eventual dismemberment of the Indian Empire, that more than anything else had caused this frantic reassessment of anachronistic patterns of Indian defence policy.

MacGregor was one of these soldier-explorers, and his "Memorandum on the Merv Question" was certainly the most important section of his *Narrative of a Journey through the Province of Khorassan and on the N.W. Frontier of Afghanistan in 1875*. MacGregor argued that the great Khivan desert should be regarded as the furthestmost limit of Russian conquest which had hitherto been justified on grounds of civilisation, philanthropy and self-protection. Hereafter, any Russian advance would be preparatory to an invasion of India. As Merv was the key to Central Asia, so Herat was the key to India. It was the nearest and best point at which an invader could concentrate and prepare for a deliberate offensive movement. It commanded all the important roads to India and was the strongest fortress between the Caspian and the Indus. Its occupation by Russia would mean effective control of Persian and Afghan military resources; it would compel India to retain disproportionately large forces along the North-West Frontier and would provide a secure base for insurrectionary warfare. The immediate danger to India, as MacGregor said, was not that of full-scale invasion, but the seizure by Russia of a strategic point enabling her to paralyze British action in Europe while stirring the elements of revolt in India. Indian defence policy should therefore aim at preventing the further extension of Russian influence into Persia, Afghanistan, Asiatic Turkey or the east coast of the Caspian. Russia should be stiffly warned that failure to withdraw from the east Caspian coast, cease operations against Merv or accept a Russo-Persian frontier north of Kara Kum would constitute a *casus belli*. At the same time, certain strategic measures should be adopted enabling Russia to be confronted—or fought—as far from the borders of India as possible. Herat, Moorgat and Kohisin should be heavily fortified and garrisoned at British expense, an intelligence system created throughout Persia to keep Britain apprised of Russian intentions and movements,

and prior arrangements made for the rapid advance of a supporting force from India. Bases for the assembly of an expeditionary force should be established at Mohammerah and Ormez, and the Persian Army trained, equipped and officered by British officers as a strike-force for operations towards Astrabad and Tabriz. Finally, the Turcomans should be pacified to prevent their precipitation of an untimely crisis. Should these measures be implemented and Russia reject the conditions of *casus belli*, MacGregor was confident of the outcome of any ensuing global war. The Russian army reforms were still far from complete and the bulk of its effective strength would be tied up patrolling recently conquered areas and otherwise defending its vast territorial perimeter. Few troops would be available for offensive operations against India—Britains' continental base. Russia could expect no allies in Europe or Asia while Britain on the other hand would enjoy the active support of Turkey, Persia, Afghanistan and Beluchistan and could raise a religious war against Russian military power in Caucasia and Central Asia with 'a few English agents jingling bags of gold near the frontier.'

As A.Q.M.G. and the only Indian soldier's contribution to this great defence debate, MacGregor's views could be said to have borne a semi-official character. His analysis of the situation closely resembled that of Wolseley, Baker, Frere and Rawlinson, and probably, in some degree, served as a basis for Colley's remarkable "Memorandum on the Military Aspects of the Central Asian Question"—the character of Lytton's defence policy. In this paper, MacGregor had translated into the practical definitions of Central Asian politics what he had already abstractly outlined in his *Essay on Mountain Warfare* and what he was to develop more fully in the *Defence of India* after Russia finally occupied Merv in 1883.

Nevertheless, even the Khivan war scare failed to impress Northbrook with the urgent necessity of reviewing and perhaps reconstructing India's defence posture. He was persuaded by Napier and Haines, the reactionary successors to Mansfield and Durand, who had the full backing of the Queen and the Duke of Cambridge, that reform in the face of danger was untimely and that 'chips from a German workshop' were unsuited to the peculiar conditions of Indian warfare and inconsistent with the unique problems of Indian internal security. He severely censured Rawlinson, the Head of the Political and Secret Committee in the Home Council, for publicly disclosing confidential documents bearing on Indian defence policy in an attempt to focus national attention upon the formulation and execution of British Indian defence policies. He continued to discourage trans-frontier exploration, and condemned the strategic analyses of Baker, Frere and MacGregor as unnecessarily alarmist and even provocative. He reluctantly consented to Salisbury's repeated demands that Napier and Roberts should devise some strategic

contingency plan for the defence of India in the event of Russian invasion and seemed quite content that it reflected the traditional concept of Indian strategy—a single decisive defensive battle to the west of Kandahar. Finally he refused to sign an offensive-defensive alliance with Shere Ali, the Amir of Afghanistan—an irrevocable step that put India on the road to the Second Afghan War.

Behind Northbrook's reluctance to change the direction of Indian defence policy that had prevailed since the great Mutiny lay the deep suspicion of the social upheaval that it would bring in its train. There was an unwholesome dread that involvement in Afghanistan could only be disastrous; that after only twenty years of suppression the conditions of a second Mutiny, though dormant, were still alive. Since British administration was overwhelmingly military in character, any attempt at reform would involve unsettling the whole structure of Indian society to an intimate degree unknown in England since Cromwell, the New Model and the Civil War. The creation of a Reserve would have particularly profound effects. Besides introducing an element into Indian politics susceptible to intrigue and revolt, it would if properly manipulated encourage the tendency towards an independent Indian foreign and military policy. It would assure the ascendancy of political rather than royal control over Indian military affairs that the Queen and the Duke of Cambridge so deprecated. For all these reasons, the early steps towards sweeping reform in Indian defence policy were extremely halting. Thanks to MacGregor's efforts —the *Indian Army Review*, the United Service Institute, the *Central Asian Gazetteer*, and the Merv Memorandum—a favourable climate of opinion was developing. But it took the multiplicate effects of a vigorous Viceroy, a major European crisis and the Second Afghan War to bring the whole question into the open.

#### IV

Although Lytton's viceregal administration was characterised by a vigorous determination to grapple with the fundamental issues of Indian defence and security raised by the Russo-Turkish War, the collapse of Turkish military power in Armenia and increasing Afghan intransigence, from 1876 to 1880, even as D.Q.M.G., MacGregor was able to exert little real influence in the making of Indian defence policy and the strategical conduct of the Second Afghan War. The Viceroy's chief military mentor and the architect of Indian defence policy in general and the Second Afghan War in particular was Colonel George Pomeroy Colley, formerly Professor of Military Administration at the Staff College, a brilliant student of Prussian warfare and military organisation, and in Wolseley's estimation the ablest of the Ring and the most promising officer of the day. Colley's celebrated "Memorandum on the Military Aspects of the Central Asian Question," which despite

some temporary modifications to suit immediate circumstances remained the essential foundation of Lytton's defence programme, was derived from an analysis of MacGregor's own appreciation, but contained significant departures that were to result directly in the Afghan War. Kabul rather than Merv or Herat should be recognised as the true key to India since it constituted a central compact offensive-defensive position controlling the most vital routes to India and enabling a vigorous counter-strike to be made with light, highly mobile expeditionary forces against Russia's most vulnerable joint—her precarious hold upon her subject Central Asian khamates and feudatory principalities. To build an offensive military policy around Persia, Afghanistan and Baluchistan and launch operations therefrom against the Russian Caucasian and Central Asian flank would be wasteful, dangerous and sacrificial. Indian defence policy should aim at controlling Kabul and destroying Russian military power in Central Asia by the instigation of a widespread insurrectionary movement spearheaded by light columns striking northwards under enterprising commanders through the Khyber and Kurram Passes.

The success of this policy depended on four essential measures, which amounted to a full-scale assault upon prevailing Indian defence conservatism : a vigorous diplomatic offensive (beginning with the Peshawur Conference) to force the Amir unequivocally to define his position either for or against India; the establishment of a network of political agents throughout the independent states intervening between the Russian and British Empires in Asia, and the creation of a military intelligence department charged with the preparation of contingency plans and mobilisation schemes "for the rapid commencement and vigorous prosecution of war *in any direction* on or beyond the borders of India;" the consolidation of the North-West Frontier under a single Frontier Commissioner, preferably Wolseley, directly responsible to the Viceroy and invested with supreme local political and military power for the conduct of trans-frontier affairs; and lastly, "a complete reorganisation of the whole military establishment in India"—involving the abolition of the three Presidential Armies and their amalgamation into four Army Corps based on a system of localisation and supported by an Indian Army Reserve.

But only the Intelligence Department—which by itself could serve no great immediate purpose—proved capable of development, as will be discussed later, before the outbreak of the Afghan War. At Peshawur the Amir stiffly rejected Pelly's terms and began openly to invite Russian support—a policy that was to result in Stotlieff's Mission, the precipitant of the Afghan War. Salisbury and Disraeli rejected Wolseley's claims as Frontier Commissioner on the grounds that his appointment, by announcing a campaign in Central Asia, would exacerbate Anglo-Russian tension in the Near East. He agreed with Northbrook, Norman and Napier that the Indian Army should retain its mutiny-tight compart-

mentalised structure and should not be subjected to untried experiments in Prussian organisation. Strategically, he accepted the thesis that India should be defended as far from her borders as possible, and encouraged MacGregor to undertake extensive reconnaissances of Armenia, the Persian Gulf and Baluchistan and to draw up contingency plans for expeditions from Batoum and Trezibond up the Tigris-Euphrates Valley and against Herat. Thus during the Merv Crisis, in June 1877, when Russia's total victories in Armenia and Lomakin's trans-Caspian expedition against the Turcomans seemed to foreshadow an immediate invasion of India, Lytton was constrained to adopt not Colley's but MacGregor's plan—hinged as it was upon the inviolability of Merv and Herat. Nevertheless, the Russian advance and Lytton's plans to wage a counter-revolutionary war were forestalled by Plevna, and for the next twelve months Constantinople rather than Merv or Cabul remained the centre of strategic interest.

In the meantime, MacGregor began forging the Indian Army Intelligence Department, a task that was still incomplete at the outbreak of war. It is probable that Captain J.A.S. Colquhoun's Durand Medal Essay on "The Formation of an Intelligence Department for India" was chosen because it most closely presented the views officially held by MacGregor and Roberts in the Q.M.G.'s Department, and seemed to adapt the Prussian and English models most suitably to Indian conditions. Colquhoun had rightly argued that the necessity for a formal military intelligence agency had not been recognised as urgent so long as the Indian Army was restricted to internal policing and cometary border expeditions, trans-frontier exploration was forbidden and political agents, explorers and trained travellers performed the functions of military attaches. But this Russian threat to India and the Prussian revolution in the scientific preparation for and conduct of war now made such an agency imperative to India's defence and survival. Its prime function would be to facilitate the strategic employment of armies on or beyond the borders of India by preparing detailed contingency and mobilisation plans, schemes for inland and coastal defence, and for the protection of railways and telegraphs. It would also be responsible for developing a system of strategic thought and military education throughout the Indian Armies. Colquhoun warned, however, that its effectiveness as an instrument of modern Indian military policy would very much depend upon the executive head chosen, his knowledge of military theory, his grasp of Central Asian topography, his eye for detail and shifting political and technological developments and his possession of official confidence—qualities with which MacGregor was admirably endowed. In collaboration with Colonel Colley, Colonel Home, the executive head of the War Office Intelligence Department, and Captain E.H.H. Cullen, Assistant Military Secretary for Indian Affairs at the



Horse Guards, MacGregor arrived at a division of territorial responsibilities between the two Intelligence Departments and established the channels of cooperation with other interested departments and non-governmental societies. At this point, the war intervened and not until July 1878, after the Treaty of Gandamak had been signed, did Lord Cranbrook, the Secretary of State for India, finally sanction the principle of an Intelligence Department.

Throughout the war, MacGregor served in several command and staff capacities, often with great distinction. He also presided over the commission established by Lytton and Roberts to investigate the Amir's alleged complicity in the massacre of Cavagnari's embassy. But the report was suppressed at the Viceroy's orders because it contained a harsh preliminary discursive critique of Indian defence policy that was quite beyond its terms of reference. Probably for the same reason, MacGregor's six-volume *Official History of the Second Afghan War*, completed in 1856, remained unpublished until 1904 when, at Lord Roberts' insistence an uncontroversial single volume condensation was finally released. Lastly, MacGregor served as a member of the abortive Eden (or Simla) Commission established by Lytton ostensibly to investigate the deficiencies exposed by the late war, but in fact to conduct a "comprehensive and exhaustive" review of the "whole subject of military organisation and expenditure in India" with special reference to the formation of a Reserve. After sitting three months, the Commission recommended, seemingly perfunctorily but in fact at Lytton's persuasion, the amalgamation of the Presidential Armies into four localised Army Corps; the removal of the Commander-in-Chief from the Supreme Council and his subordination to the Military Member who would now administer a unified War Ministry retaining the Commander-in-Chief as his principal adviser; the creation of a General Staff, and the formation of a Reserve. The Commission's Report was vigorously opposed by the Queen, the Duke of Cambridge, Haines and the Home Council; the fall of Disraeli's government, Lytton's own resignation, Roberts' removal to Madras and Colley's assumption of the Natal Command further delayed its publication; and in 1884 embroiled in Soudan affairs, the Liberal Government finally shelved.

Thus MacGregor's most constructive efforts to alter the complexion of Indian defence policy, and focus public attention upon it, had been thwarted when they might have been most useful. Gladstone's government, pledged to an anti-annexationist policy and a return to the principles of masterly inactivity that Lytton had so dishonourably violated, was disentangling itself with unblushing haste from the coils of the Armenian Convention and the Zulu and Afghan Wars—a situation exploited by Russia for continued advances in Central Asia. Salisbury's miniature army of military consuls in Asia Minor were withdrawn, trans-frontier

reconnaissance was once again discouraged and the obstructionism within the Military and Political Departments towards the new-found Intelligence Department materially strengthened. In this vindictive political atmosphere, neither MacGregor's *Official History* nor the Eden Commission Report, in spite of their intrinsic merits, had much hope of publication. It was this sense of censored constraint and frustration, alarmingly aggravated by Gladstone's wayward indifference to the Russian occupation of Merv while absorbed in Egyptian, South African and Near Eastern affairs that impelled MacGregor to the desperate measure of publishing his exhaustive confidential study of *The Defence of India*, a step that almost cost him his job and certainly his life.

## V

From 1880 to 1885, MacGregor served as Q.M.G. in India, and it was the authority inherent in this position that made the precipitate publication of *The Defence of India* such a controversial matter. In its preparatory stages, he had consulted the ablest military minds and local experts on Asian warfare such as the Hon. G.N. Napier, Sir Robert Sandeman (Governor of Khelat), Sir Frederik Roberts (Commander-in-Chief, Madras) and Sir Donald Stewart (Commander-in-Chief in India), and to this extent it might be said that the work embodied a unanimity of official military opinion in India. *The Defence of India* consists of seven chapters and sixteen appendices arranged in the form of a military "appreciation of the situation." MacGregor estimated that the total conscriptive manpower of the Russian Empire, including its European Slavic satellites, numbered 1,928,510 men and 4394 guns, of which 1,237,000 men would be required for internal security, the defence of the German, Austrian, Turkish and Chinese frontiers, the pacification of the Caucasus and the policing of her recent Central Asian conquests. Of the remainder available for the invasion of India he calculated that within 80 to 100 days after mobilisation Russia could seize Herat, Kabul and Chitral—the keys to India—with a strike-force of 95,000 troops operating in five columns. Having occupied these vantage points Russia could then consolidate her strategic position, improve her rail, marine and river communications from Europe to Central Asia, and await or create a convenient opportunity for a full-scale invasion of India. As opposed to this, after providing for the security of strategic arsenals, factories, and ports; railways and telegraphic centres of commercial or administrative importance; Burma and the independent principalities against mutinous outbreaks, the Indian Army could barely muster within a month along the frontier 10,000 British and 37,000 Native troops, without reserves, half of which would in any offensive movement be consumed by the lines of communication. Therefore in order to gain time to convert India into a nation-in-arms and bring reinforcements from England, certain diplomatic measures were imperative.

A coalition should be forged with Germany, Austria and Turkey for the provision of manpower and points of access, an alliance made with Persia for the control of Herat, and a rapprochement with China for diversionary purposes. In Central Asia, Moslem emissaries should raise the Khanates and Turcomans in rebellion; while at sea, the Fleet should wage a war of blockade, economic sanctions and commerce-destruction. Over 65,000 British and 220,000 Native reinforcements would be required to maintain an Indian Army of 120,000 on a war footing for operations beyond the frontier. For internal garrison and line-of-communication duties, MacGregor proposed raising a motley army consisting of conscripted Eurasian militia (103,000), native Christians (100,000), pressed maritime crews trading in Eastern waters (6,000), Colonial contingents from Australia, Canada, New Zealand and the Cape (24,000), border levies (34,000) and irregular native soldiery (348,000). Indian strategy should aim at creating diversions in trans-Caucasia or Europe while seizing and fortifying Herat. The Quadruple Alliance should launch expeditions from Poland, the Caucasus and Turkestan. The Khanates should be raised in insurrection and a Chinese army under British direction advance westward beyond Kashgar. Not until Russia was driven out of the Caucasus and Turkestan, MacGregor concluded, could there ever be a lasting settlement of the Russo-Indian question.

In a prefatory note, MacGregor emphasised that as a purely private and strictly confidential publication having no official character the book was directed not to the general public but to the makers of Indian defence policy both in Whitehall and Simla. An advance copy was sent for comment to the Viceroy and others were circulated to a select number of military authorities, such as General Sir E.B. Hamley, Members of Parliament, Heads of Departments (including six copies to Colonel A.S. Cameron of the War Office Intelligence Department) and discreet publicists, with the express object of eliciting further information and criticism for a second edition. Lord Kimberley, the Secretary of State for India, received "Sir C. MacGregor's blue-book" with amused cynicism. "I have never read anything wilder", he wrote. "Does he intend that when we have driven Russia out of the Caucasus and Central Asia, we should hold these countries." The moral he drew was that Britain should sedulously avoid any extension of her responsibilities which would render necessary the employment of increased land forces. "But our Jingo goes would annex the whole world without giving a thought to the provision of the means to maintain our authority". So long as the book remained guardedly distributed within a comparatively closed circle, the Government absorbed as it was with the competing claims of Sudan affairs and Afghan Boundary negotiations, chose to ignore it. But in early October, the *St. James Gazette*, a Conservative organ hostile to Gladstone's imperial policy, published an article about India based largely

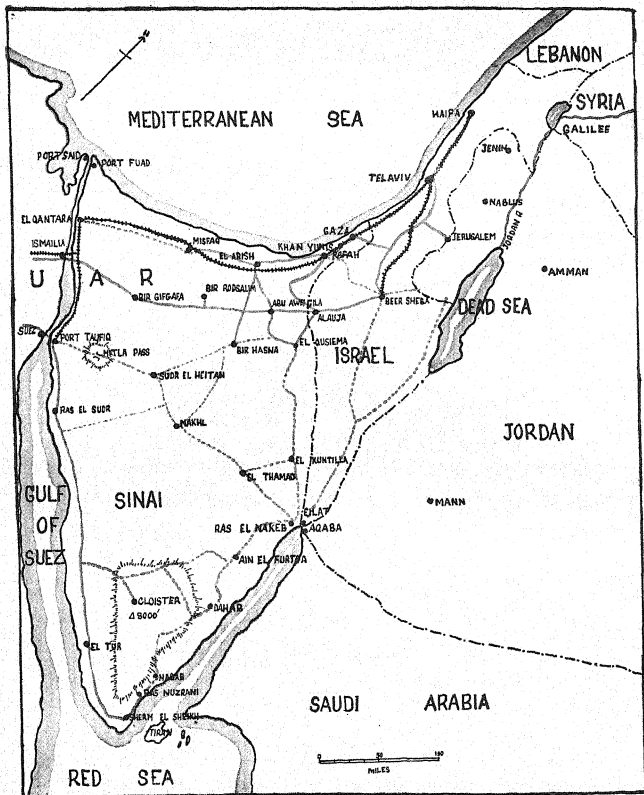
upon extracts from MacGregor's work. A political tempest arose. This "alarmist treatise," wrote Kimberley stiffly to Ripon, might prejudice the Afghan boundary negotiations and there was already evidence of stiffening Russian attitudes. Had the Viceroy or Commander-in-Chief authorised its printing and circulation, and if not, did they intend "officially disapproving" a book of "such a delicate and confidential nature?" Ripon replied that no such authority had been given, that he could not overlook the indiscretion and that MacGregor must be censured. "But dismissal would go beyond the case and make a martyr of him." Kimberley agreed that in view of the extreme sensitivity of imperial affairs, it would be wise "not to make too much of the scandal." MacGregor himself was "cautioned" by the Supreme Council and withdrew all copies known to have got into the hands of unscrupulous journalists or editors. "It was in no petty search for notoriety I wrote the book and circulated it," he explained privately to the Commander-in-Chief. "I saw then—I see now—a danger hanging over our Indian Empire, and I considered it my duty to point it out clearly and fearlessly. I did so. I endeavoured to tell the whole truth on the subject, and I submitted it for the honest consideration of all. I meant to have performed a public service and now find I have committed an official mistake....."

*The Defence of India* was MacGregor's last demonstrative act to influence the course and character of Indian defence policy. It was probably decisive, although he did not live to see the results. It is said that copies found their way to the Russian War Office and by a fatal paradox, heightened and prolonged rather than alleviated Anglo-Russian tension in Central and South-East Asia. But it is also true that from the conclusion of the Penjdeh crisis—when MacGregor's truths rang with startling relevance—until the rise of German naval power and the Russo-Japanese War and transformed the international power structure and made possible the Anglo-Russian Convention, the *Defence of India* remained the definitive bible of all Indian Viceroys and Commanders-in-Chief in the making of a rational defence policy and viable military organisation. Dufferin and Roberts introduced a vast construction programme of defended outposts and strategic railways. By 1914, the Presidential Armies had been amalgamated to form a national Indian Army, supported by its own Reserve and exercised in Army-scale manoeuvres.

But the *Defence of India* should be seen as part of a much wider achievement. For the first time in Indian history, the question of Indian defence had been scientifically analysed in relation to the new conditions of warfare, of Russian imperial developments and of international diplomacy. And this would have been singularly impossible had not MacGregor provided the facilities and the raw material for the informed discussion that is seminal to the creation of an intelligible and balanced defence policy. Out of these institutes and journals emerged in the course

of time a sense of Indian Army professionalism separate and distinct from that of its British counterpart. MacGregor's emphasis upon the Indian nation-in-arms as the only means of providing for its own security contributed to a growing consciousness of the inseparability of military power and national autonomy. In some small sense, MacGregor might be considered the father of modern defence of India.

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THE ARAB ISRAELI WAR

# THE ARAB ISRAELI WAR

BY FANGA LA

The speed with which the Israeli army has twice overrun the Sinai has perhaps left an impression that they had an easy time moving at top-speed through fleeing hordes of disorganised infantry. This view is unjust both to the Israelis who fought hard and paid dearly for their victories, and to the Arabs whose units gave a good account of themselves although surrounded and overwhelmed by superior air and ground forces.

It is not intended to discuss the political and social problems which led to the actions in 1967. Whether Israel should be entitled to shipping rights in the Gulf of Aqaba and who fired the first shot in the Middle East are issues for politicians to argue about. Without entering into the tangled politics of the situation, it is proposed to describe briefly the military aspect(s) of the Arab-Israeli conflict. However, to establish the scene we must recapitulate major historical events. Moreover, since in military terms it can be said that the Arab states have considered themselves in an approximate state of war with Israel ever since the latter's emergence as a state, it becomes also necessary to summarise the military actions commencing from 15 May, 1947—the date from which the Jews and Arabs began fighting each other seriously. The 1967 battle was a continuation of this fighting and may not have ended the war.

## THE FIGHTING MEN : ARABS AND JEWS

**T**HE Arabs rose to be a military power in the 7th century when a number of tribes joined together under the banner of Islam and set out to conquer the infidel. Victoriously they subjected Syria, Iraq and Egypt and by the 12th century reached their zenith when they defeated a Crusader army and conquered Jerusalem. But, by the 13th century the Arab empire began to disintegrate under pressure from Ghengiz Khan's hordes. For the next few centuries the Arab tribes spent their time fighting against each other till the Turks became their overlords.

The true Arab originated from the nomadic tribes of the desert who have a fine fighting heritage. Today the term Arab covers 14 nations populated by people of the Islamic faith ranging from *Morocco* in the West to Kuwait in the East. However, there is a strong tradition of courage and of soldierly instinct among these nations, both in the cities and in the deserts.

It is not as well known that the Jewish soldier has a magnificent tradition as a fighting man. The Bible is full of stories of their battles. Even in the more recent past, an all-Jewish unit had fought faithfully under Napoleon at Waterloo, losing 35 officers and over 200 men.

Again, in both the world wars, large number of Jews served in the armed forces of various countries that took part. Their bravery was well recognised. For example, in World War II, over 25,000 decorations for bravery were awarded to Jews serving in the US Army alone. The recent wars in the Middle East have brought into prominence the re-appearance of the Jew as a superb fighting man.

However, to revert to ancient history, under King David's rule, the Israelite soldier was feared and respected throughout the Middle East, but in course of time the Israeli Kingdom declined. They lost their independence and were conquered successively by the Romans (A.D. 135), Arabs (636), Crusaders (1099), Mamelukes (1250) and Turks (1517). A few Jews hung on to their ancestral lands but the majority dispersed all over the world. Their lands were mostly settled by Muslims.

### HISTORICAL BACKGROUND

For centuries Palestine has been regarded as sacred by the Christian, the Jew and the Muslim. Almost from the dawn of recorded history it has been a battle-ground with passions inflamed by religious zeal. The name Palestine comes from the Hebrew 'Pelescheth' and means 'Land of the Philistines'. The Romans, after conquering the land named it Syria Palaestria, after the Jew's most hated enemies, the Philistines.

By the 19th century the Jewish race was scattered to the four corners of the world and only a few lived in Palestine, leading a miserable existence. In 1897, the Zionist Organisation was established. The founders believed that the only refuge for Jews from the widespread persecution they suffered in foreign lands was to have a land of their own. After considering several possibilities for a homeland it was decided that Palestine was that land. The Zionists established centres in all countries where there was a Jewish community and won support, especially in Europe where the persecution was most severe. The Zionists contacted the Sultan of Turkey but found him unsympathetic to their cause. Nevertheless, in the face of Turkish disapproval, they established settlements in Palestine. Money was limited and the condition of early settlers was severe but a number of them stuck to their Promised Land in the face of great hardship.

By World War I there were about 85,000 Jews in Palestine. The British, who held a League of Nations Mandate over Palestine, gave contrary hopes to both the Arabs and the Jews. This led to years of confusion and unrest during which the Zionists went ahead with their plans, and the Jewish population rose to 108,000. The Arabs became anxious lest they found themselves in a minority. Hitler's rise to power in 1934 increased the flow of Jewish immigrants. Animosity was now fully aroused against the Jews, and bands of Arabs roamed the country attacking isolated settlements.



The Haganah, a Home Guard which was mobilised to protect Jewish settlements remained on the defensive. Jewish leaders had set themselves against a policy of retaliation. However, an extremist organisation the Irgun Zvai Leumi (IZL) disagreed with this policy and hit back at the Arabs. In an attempt to find a peaceful solution, Britain put forward a Partition Plan in 1937, but this ran into difficulties over the allocation of certain areas. In 1939 a British White Paper stated that the cause of Arab unrest was the rate of Jewish immigration and proposals were made to limit the influx of Jews and restrict land purchases by them. By now it was not European but American Jewry which had gained authority in the Zionist movement.

When World War II broke out, the Jews came in whole-heartedly on the side of Britain against Hitler. A Jewish Brigade came into being and their dissident organisation suspended subversive activities. After the war, the restrictions on Jewish immigration was still in force. But the tragedy of the wholesale massacre of Jews in Europe and the survivors from concentration camps became an immediate problem. Strong pressure was put on Britain to allow larger numbers to enter Palestine. The Arabs strongly resisted any increase of the quota. Britain hesitated to take a decision. The Jews in Palestine openly revolted against the Mandatory Government. 1946 was a year of terrorism. Many policemen, British soldiers, Arabs and Jews were killed without the culprits being brought to book. Britain, exasperated and harassed, decided to relinquish their Mandate. Their troops gradually withdrew to the ports and large areas were handed over to the Jews and Arab police.

Meanwhile, a committee which had examined the Palestine problem submitted its report which in brief recommended partition giving Jerusalem an international status. On November 29, 1947 a resolution was passed in the General Assembly of the UN approving this recommendation. The British Mandate ended at midnight on May 14, 1948 and the *de facto* state of Israel came into being and was recognised by the leading world powers and others, including India. To the Jews, Israel is both a state and a state of mind. Named after Jacob, whose battle with the Angel of God led him to be called 'Israel—He who struggles with God', it is the fulfilment of a struggle that has pitted the Jews against the world for 2000 years.

Arab reaction was immediate and violent. Charging that the Jews had usurped Arab land, the combined armies of Egypt, Jordan, Iraq, Lebanon and Syria marched on Israel the following day.

#### THE FIGHTING : 1948-1949

In the early stages the general opinion in Arab countries was that as soon as the British troops left, the Jews would be driven out of Palestine.

The majority of the Arab armies entered the fray in a light-hearted spirit. Only a few realised the depth of Jewish organisation and their high morale. For the first month the Israelis fought with their backs to the wall using only small arms and home-made mortars. Outnumbered, in some places by as much as 20 to 1, the Jews lost ground but by sheer grit and determination they managed to hold their own. A truce was declared in June 1948. The Israelis eagerly welcomed it as it gave them a vital breathing-space which they needed to build up and train their armed forces, and to absorb the quantities of war material that had begun to pour into Israel from abroad. The Arabs were not happy about the truce. They realised that their dream of driving out the Jews was fading away.

The truce was broken after 4 weeks by a short sharp action. The main fighting took place on the Syrian frontier and around Galilee. The Israeli army, with armour, artillery and aircraft at its disposal, severely shook Arab complacency, driving them back in many places. The Jewish soldier, using modern weapons and fighting with a burning zeal confounded observers and unsettled the Arabs. The comparative valuelessness of irregular forces, be they Arab or Jewish terrorist organisations, was apparent. The Jews took early steps to rid themselves of their Haganah and IZL irregulars and to unify their army. After their first taste of victory, their regrouped disciplined army launched four separate operations against the Arabs, all of which were successful. The first was undertaken to clear the areas between Tel Aviv and Jerusalem. The second and third cleared the Arabs out of the northern districts and Galilee. The last operation was directed to the south and pushed part of the Egyptian army back into the Sinai.

Two features stood out from these operations. Firstly, the failure of the Arabs to join together in a holy war against the infidel. Their common religion was apparently not strong enough to persuade them to sink their differences and personal ambitions and unite against the Israel. Another surprise was the inaction of Arab troops. The Arab was well known as a tough irregular; the romantic Lawrence-of-Arabia-desert-raider who liked to fight for a day and then retire for the night. But more was expected from their regulars trained on western lines. These operations exposed their weaknesses, limitations and inefficiency. The Arab Legion of Jordan was an outstanding exception.

The value of mobility was quickly appreciated by Israeli commanders. Lack of it mainly contributed to the Arab failures. Israeli tactics emphasised the age-old principles of night attacks, rapid indirect approach marches and offensive action; all of which paid big dividends against an over-confident static opponent. The fact that they fought on interior lines of communication was a big asset to the Israelis. They made use of small bodies of infantry mounted on jeeps which were switched rapidly to wherever required.

During this phase of the war, 750,000 Palestinian Arabs fled or were evicted from their land and stayed in refugee camps across Israel's borders waiting to return. The Israelis made no excuse for ousting Arab inhabitants from their homes; it was all part of their plan for reconquest of their Promised Land. There was no room for large hostile alien groups in their tiny homeland where 2,700,000 people (half the population of Bombay) clung to 7993 square miles.

### THE SINAI PENINSULA : GROUND AND RELATIVE STRENGTHS

The Sinai Peninsula forms a triangle with its southern tip jutting into the Red Sea. Its boundaries are well defined on all sides except with Israel, where it is nothing but a surveyor's line in the desert sand. In the north-eastern corner, the Gaza Strip juts into Israel's flank. The Sinai comprises 24,000 square miles of almost nothing and is populated by 40,000 Arabs living in the small towns situated along the shore-line or at oases and road junctions. The Gaza Strip contains 250,000 Arab refugees under the care of a UN relief agency. The Egyptian army had built several modern airfields capable of accommodating jet fighters at Bir Gifgafa and elsewhere in the Sinai.

The Peninsula can be conveniently divided into three horizontal bands. The desert lowlands form the Northern Sector. This is about 60 miles wide and consists of large open stretches of sand; sometimes firm and easily trafficable, in other areas impassable even for tracked vehicles. Occasional ranges of low hills dot this barren sea of sand. To the south of this is the Middle Sector: a 100-mile wide plateau which is more rugged and arid than the Northern Sector and criss-crossed by many nullahs. Vehicle movement is restricted but the terrain is accessible to four-wheel-drive vehicles. The Southern Sector lies to the south of an imaginary line drawn from Suez to Eilat and consists of the nearly waterless Sinai mountain tract which constitutes the most inhospitable region in the Middle East. Along the Gulf of Suez there is a flat narrow coastal belt but along the Gulf of Aqaba the mountains crowd right into the sea.

The sandy soil in the Northern Sector is unstable and thus the coastal road from El Qantara to Gaza via El Arish is of minor importance. The major road connects Ismailia with Beersheba via Abu Aweigila. A less well-developed road connects Suez with Ras El Naheb via El Thamad. A road has been built along the coast from Suez to Sherm El Sheikh controlling the entrance to the Gulf of Aqaba. A long narrow ridge runs from north to south bisecting the Sinai Peninsula. This feature will be referred to as the Central Ridge. It is an important obstacle as it sits astride the eastern approaches to the Suez Canal. The mountain passes through this ridge have a defensive potential. The most important of these passes is the Mitla Pass.

Contrary to popular misconception, the Sinai is not suited to offensive mobile operations. Although many tracks and roads, and parts of the open country are accessible to tracked or wheeled vehicles, moves are canalised by mountain ranges, ridge lines, nullahs and impassable sea sands. Consequently, mobile manoeuvres by an attacker can be foreseen by a defender. Theoretically, this should facilitate the defender and allow small mobile forces to play havoc with an attacker, provided the defender is well organised and deployed for use in a mobile role.

Although the Arab armies put down their guns after the 1949 Armistice, their governments refused to recognise the existence of Israel. Their pride was stung and they swore vengeance. By 1954 Colonel Nasser was in power in Egypt whose people sincerely believed that corruption of the previous regime had caused their military defeat. They looked to Nasser for an 'Arab Revival'.

In July 1956 Egypt nationalised the Suez Canal and fearing a violent reaction from Britain and France, withdrew three divisions from the Sinai to defend the Suez. The Egyptians were left with 30,000 troops in the Sinai. One infantry division, with three brigades was deployed in the El Arish-Abu Aweigila area; one brigade with irregulars which included a Palestine Army of Liberation brigade was located in the Gaza Strip; the other communication centres in the Middle and Southern Sectors were held by two battalions equipped with armoured jeeps. One armoured brigade equipped with 70 Soviet T-34 tanks were available as a reserve in the Bir Gifgafa area. The Egyptian air force was then estimated at 250 Meteor and MIG jet fighters, 50 Illyushin jet bombers and about an equal number of transport aircraft.

In October 1956 Jordan and Syria signed a military alliance with Egypt placing their troops under her command. In the view of Israeli military planners this action created a dangerous situation; Israel was only 10 miles wide in some places and only 8 minutes flight away from the nearest Arab air-bases and they had no second line of defence. They appreciated that in case of sudden attack they could no longer guarantee even partial completion of their mobilisation. In terms of hard military facts they believed that they had no sensible alternative but to attack. The backbone of the Israeli air force was 50 Mystere jet fighters; they also had some Ouragan jet fighters and World War II vintage Mustangs. The Israeli navy was designed to protect the coast. In terms of air and naval power the balance definitely was in favour of Egypt until France and Britain intervened in the war.

However, on the ground, the Israelis were superior in numbers, organisation and mobility. The basic formation of the Israeli army is the brigade. There is no standing army as such, merely a regular cadre of about 35,000 who provide the framework and leaders for the brigades

which are activated both for defensive and offensive tasks. The Israelis committed about 45,000 men in this operation not counting those deployed in the rear and administrative areas. This force was organised into 8 brigades: 5 infantry, 2 armoured and 1 airborne, each of about 5500 men. The mainstay of their armour was the French 13-ton AMX tank.

### THE SINAI CAMPAIGN—1965

The Israelis operated in three main columns. One for each of the Sectors; and a separate force for the Sherm El Sheikh area. The first column struck in the Southern Sector on the afternoon of October 29 in a movement from El Kuntilla to Mitla Pass via El Thamad. They moved fast and avoided contact. At the same time a part of the airborne brigade was dropped about 7 miles east of the Pass. The Egyptians were surprised and appeared to have been more concerned with a likely British and French attack. However, by night of 29/30 October their troops were alerted. At first light on October 30 their aircraft hit Israeli tactical targets causing some damage.

Meanwhile, at first light in the Middle Sector an Israeli brigade attacked El Qusiema but failed to secure this; they were counter-attacked and driven back by the Egyptians. The Israelis repeatedly attacked the position using aircraft and napalm. The Egyptians eventually withdrew to Abu Aweigila, one of the strongest fortified hill positions in the Sinai. An attempt to capture this was broken off with losses. The Israelis left a small force to contain this garrison and bypassed the position. By the evening of October 30, they were well to the west of Abu Aweigila. By now, at Mitla Pass, their ground forces had linked up with the airborne troops but were still east of their objective.

On October 31 Israeli columns in the Middle Sector swing southwest via Bir Hasna and linked up with their troops facing Mitla Pass which was still in Egyptian hands, as was Abu Aweigila. In the Northern Sector Egyptian troops in the Gaza Strip were bottled up but intact. Moreover, Egyptian armour and infantry reserves were moving across the Canal to reinforce Bir Gifgafa and Mitla Pass; a move which presented a grave risk for the exhausted Israeli para-troopers. The battle was still undecided. The Israelis knew that it was vital for them to open the road via Abu Aweigila which was surrounded from all sides by their forces which were busy repelling half-hearted Egyptian armoured counterattacks from the El Arish area.

Two Israeli brigades attacked Abu Aweigila at midday on October 31, under cover of heavy air attacks. The battle lasted up to 8 p.m. Losses on both sides were heavy and the Egyptian garrison was eliminated. At the same time the airborne brigade reinforced by additional ground forces attacked Mitla Pass and after hand-to-hand combat secured the area by

the evening. By now the paratroopers had reached the end of their tether. Had Egyptian reinforcements been able to reach the Pass, it would have seriously endangered their position. It was significant that the Israeli air force was able to seal off the area by round-the-clock straffing of Egyptian road columns moving from Suez to the east.

It was at this time on October 31, that France and Britain handed their ultimatum to President Nasser, followed a few hours later by their joint attack. Nasser ordered the withdrawal of all troops from the Sinai shortly after. What followed developed into a race for communication centres with the Egyptians trying to hold these till their troops withdrew and the Israelis carrying out deep pincer moves to trap retreating columns. By November 4 Israeli troops had reached the Gulf of Suez but their rapid pace and Egyptian resistance had levied their toll upon them. When their 7 Armoured Brigade reached opposite Ismailia it was composed of only 8 battle-worthy tanks, four of which were captured Soviet ones.

Though the battle was undecided till the Anglo-French forces intervened, it is fair to say that the Israelis then comprised the most effective fighting force in the Middle East. The performance of the Egyptian army, judged against the background of its previous performance in 1948-1949, indicated that they had improved greatly. Individual units fulfilled their assignments even against great odds. The dominant factors which contributed to Israeli military success were imaginative leadership better communications and—in the latter stages, air support from Britain and France. On the Egyptian side, a lack of overall coordination and static thinking by commanders affected their performance. Both sides had suffered a heavy toll in vehicles and disorganised logistics when their convoys were caught in the open without air cover. The contestants were convinced of the absolute necessity of adequate air cover.

### THE PERIOD UP TO MAY 1967

All indications seemed to point to a great Israeli success, more so as they only lost 171 dead, had 600 wounded and only had one soldier taken as prisoner of war. Against this they destroyed a large part of Egypt's immediate war potential, mauled about two divisions and captured 5000 soldiers who were returned to Egypt. General Dayan is quoted to have said: "We did not want to kill a lot of Egyptians. There are 40 million Arabs, so what's the use of killing 5000, 10,000, 15,000 of them? It was not even vital to destroy or take their equipment. They could always get more from Russia. What mattered was their defeat."

What, then, was Israel's war objective? Simply to create a long lasting deterrent effect upon the Arabs until a political settlement could be reached? An application of the Clausewitzian theme of extending national policies by other means? We are taught that the ultimate object of all military

operations is the destruction of the enemy's armed force in battle. Judged purely from the military standpoint, it would seem that Israel has deliberately disregarded a legitimate military objective which was within their reach, viz. trained Egyptian military manpower which it would have been very difficult for the Arabs to replace; specially such trades as technicians and tank and gunner junior leaders. It was not surprising that Egypt quickly replaced her lost equipment with new and better material. The presence of a UN Emergency Force in the Sinai prevented direct confrontation between the chief contestants.

The Arab governments still refused to recognise Israel's existence. They sincerely believed that they had lost this time only because of Anglo-French intervention. Despite the hostilities of her neighbours, Israel lived in the heady climate of prophecies fulfilled and glory resurrected. Jews poured into Israel and the population tripled and within the next 10 years the gross national product soared by 10% a year till by 1964 they achieved a standard rivalling that of Europe. But this pace could not last for ever. Immigrants stopped coming, donations from abroad dropped and an economic recession followed. By 1966, 100,000 workers (more than 10% of the labour force) were looking for jobs in a land that had never heard of the word unemployment. This recession coincided with a yearning by the common Israeli to settle down and enjoy some of the fruits of his labour. The revolutionary joys of a spartan existence were beginning to fade. The average Israeli wanted to live it up a little. 11,000 Jews migrated to Canada and the USA; some disillusioned, others dispirited by the steadily increasing number of terrorist raids across the borders.

261,000 Arabs still lived in Israel. Those over 18 were allowed to vote and form their own parties. Six Arabs were members of the Knesset (parliament), nonetheless their settlements were under military governors and Arabs had to obtain special permission to travel and were considered a potential fifth column. Meanwhile the plight of the Palestinian Arab refugees was tragic. Those that tried to return were shot at or sent back across the border.

Commando type raids continued along Israel's borders but these were answered with massive Israeli retaliation, and the Arab states appeared to be as disunited as ever. King Hussein of Jordan and President Nasser had pronounced each other foe. 50,000 UAR troops were bogged down in the Yemen where King Faisal of Saudi Arabia opposed Egyptian designs. In early May 1967, in reply to taunts from Jordan that Egypt was taking shelter behind the UN Emergency Force in order to avoid a confrontation, President Nasser declared that the UAR would choose the time and place for the next decisive battle against Israel. The implications were that the UAR with its commitments in the Yemen was not yet prepared

for a military show-down. Then, surprisingly, on May 17, the UAR moved troops in broad daylight into the Sinai; on May 20 they secured the withdrawal of the UN Emergency Force; and on May 23 they closed the Gulf of Aqaba to Israeli shipping. These were impressive Egyptian gains.

Jordan has a 350-mile border with Israel, the longest frontier any Arab country has with Israel. This border could have been Israel's Achilles' heel but for Jordan's weakness and Arab disunity. With the movement of forces from other Arab countries into this area, this could become Israel's most vulnerable frontier. On May 30, King Hussein made a dramatic air-dash to Cairo to sign a mutual defence pact which provided for joint defence council and Egyptian command of the Jordanian armed forces in the event of military hostilities. This was conclusive evidence that Nasser's moves against Israel had won for him an ascendancy in the Arab world and indicated a solidarity which the Arabs had not enjoyed since 1956. Even as the encirclement of Israel by treaties was being completed, troops from Iraq began moving into Jordan. The Arabs could cut Israel in two at its narrowest point, thus preventing the mobilisation of its armed forces, which was the one solid foundation of Israel's security. Israel was faced with the prospect of hostilities on three fronts or a slow death.

### ISRAELI REACTIONS AND EGYPT'S DILEMMA

On June 1 Moshe Dayan, the one-eyed hero of Israel's 1956 triumph over Egypt, was recalled to direct Israel's Defence Ministry. Dayan first learnt soldiering from General Wingate who trained the Haganah night fighters to meet Arab attacks in 1936. He had lost his eye when he took part in a British commando raid into Vichy-held Syria in 1941. He headed a commando unit on the Jerusalem front in 1948 and was promoted to direct the Sinai campaign in 1956. Always an exponent of élan in battle, the disciple turned Wingate's teaching to a fine art which he exploited to the full in 1956. His recall to the Defence Ministry gave a boost to Israeli morale and was greeted by excited Tel Aviv street crowds with shouts of "Moshe, go, go !" It seemed that the events of December 1956 were repeating themselves and Israel once again had no sensible military alternative but to attack first for survival.

But this time the military situation was different in vital essentials. The Western Powers could not be expected to intervene openly in the presence of Soviet ships in the Mediterranean; Israel would have to be prepared to fight alone. On the other hand, Jordan and Syria were both now allied with Egypt. Moreover, the great powers, over the past few years had poured modern arms and aircrafts into the Middle East. There were reports that Egypt possessed missiles which could hit Israeli cities.



It also seemed doubtful if Israel could guarantee the safety of her cities from air attacks or avoid a long war which she could not afford. Perhaps these changed military considerations may have been the primary reasons for Nasser's bold moves and the Egyptian army's self-confidence.

On June 2, Israel charged that Egypt had deployed 5 divisions including 900 tanks on the Sinai border and another 200 tanks opposite Eilat. These were reported to be Soviet T-54 heavy tanks with some light tanks. In addition to this, the Egyptians were reported to have some SA-3 missiles and 500 combat aircraft which included 130 MIG-21 fighters with air-to-air missiles, and 150 bombers. Jordan was known to have an army of 65,000 with M-48 Patton tanks and some US F-104 fighters. The Syrian army was reported to be 80,000 strong with 350 Soviet T-54 tanks and Soviet 'Styx' missiles.

Against this formidable array of Arab arms, the Israelis were capable of mustering 200 M-48 Patton tanks, 250 Centurion Mk 5 and MK7 tanks, 150 AMX-13 tanks and 200 Sherman MK 4 tanks. In addition to this, they had a large number of jeep-mounted 106 recoilless anti-tank guns and some French SS-10 and SS-11 guided anti-tank missiles. The Israeli air force consisted of an assortment of over 400 combat aircraft and helicopters. Among these were the very latest French fighters and bomber's Vantour 2A, Mirage III-C and Super Mystere IV-A aircrafts. Two battalions of US Hawk surface-to-air missiles were also available.

The Arab forces, though formidable on paper, had still to be unified under a central command. The Syrian army in the north was incapable of effecting a break through the Israeli strongholds facing them. The Jordanian army were well trained but only capable of a defensive role. Thus it was anticipated that the Sinai front would be the main scene of fighting. Tactically, the Egyptian commander in the Sinai was caught in a dilemma. General Mushim Kamal Mortagi, the Commander-in-Chief of Sinai, was a dedicated infantry officer, a quiet, sensible, professional soldier who reportedly practised yoga. General Mortagi knew that the Central Ridge provided the only effective natural defence in the Sinai Peninsula. Here, a few well-located defended areas backed by strong mobile armour reserves would force the Israelis to fight over extended lines of communication on Egyptian terms. Under these circumstances, the Israel border needed to be held only by a light reconnaissance screen.

But these tactics presupposed an entirely defensive posture. It was desirable that General Mortagi pose a military threat to Israel in order to lend credibility to their security pact with Syria. Moreover, politically Nasser could not afford to abandon the explosive Gaza Strip nor most of the forward bases in the Sinai. Thus, General Mortagi was compelled to strike a compromise between an offensive and a defensive posture,

between military reality and political necessity. There are conflicting estimates of the UAR forces deployed in Sinai in June '67. In the absence of any official Egyptian announcement, it may reasonably be taken that not less than two armoured and two infantry divisions were deployed in the Sinai as follows :—

- (a) One infantry division opposite Al Auja.
- (b) One armoured division with the bulk at Abu Aweigila and an element in depth at Bir Gifgafa.
- (c) One infantry division at El Kuntilla and Ras El Nakeb.
- (d) One armoured division in the triangle Milta Pass, Bir Hasna and Nakhl.

In addition to these formations there were irregular brigades positioned in the Gaza Strip at Sharm El Sheikh. As in 1956, the bulk of the forces was located on the border and the remainder distributed in penny-packets over communication centres in the Peninsula. This was an open invitation to encirclement as the vast frontier was vulnerable to rapid Israeli moves. This advance mortgaging of operational freedom due to a confusion of military aims and political considerations may not have been the sole factor which proved fatal to the Egyptian defence of the Sinai, but must have affected the morale of these who realised that they were being committed in advance to a deployment of which they had previous bitter recollections.

On June 3, Moshe Dayan told newsmen in Tel Aviv that "it was too late for a spontaneous military reaction to Egypt's blockade of the Gulf of Aqaba . . . and still too early to draw any conclusion on the possible outcome of diplomatic action." This statement received wide publicity. In retrospect it appears to have been a deliberate attempt to disarm the Arabs and foster their complacency. It is likely that the Israeli decision to attack was taken soon after the constitution of the joint Egyptian - Jordanian-Syrian military command.

Speedy mobilisation was the key to survival for Israel, who claimed that she could mobile 12 brigades in 12 hours and complete the total mobilisation of 125,000 combat troops (25 brigades of 5000 men each) within 48 hours. Mobilisation was carried out methodically, quickly and quietly, literally by word of mouth. Unit commanders picked up their men, stores and trucks from their homes or places of work before the unit moved into a concentration area. Israeli tanks each manned by a single regular of the standing army, waited in tank parks for the three civilian reservists required to complete the crew. The tanks were then ready to move out; each crew had been given battle orders and objective. All were elements of system that Dayan had helped to create when he was Israeli Chief-of-Staff. The mobilisation plans were so precisely scheduled and timed, that when the initial Israeli assault waves crossed

their border to attack the Arabs, their citizen army was still being mobilised and moving into their assembly areas for second and third phase tasks.

### THE 1967 CAMPAIGN

Israel opened her offensive with a dawn air attack on June 5. This was based on a very careful study of the Egyptian and Jordanian radar networks and dawn air-patrol schedules. Israeli planes took off from bases near Tel Aviv and flew north into the Mediterranean. Having completed a 120-mile arc over the sea, they turned south and entered UAR air-space at a point well to the west of Port Said while Egyptian patrol planes were returning to their airfields with empty fuel tanks. This gave two advantages. Firstly, the 2800 feet ranges south of Tel Aviv hid the northward flight of Israeli aircraft from the Jordanian radar screens. Secondly, as the aircraft flew in 500 feet above the waves, they were too low to appear on the Egyptian radar network. Added to the factor of surprise was the apparent lack of mental preparedness on the part of the Egyptians.

The first strikes were against four air-bases in the Sinai and bases deeper inside Egypt. At the same time, jets also struck at Arab bases in Jordan, Syria and Iraq. Initially over 200 combat fighters were destroyed on the ground. Israeli pilots worked non-stop on the first day. They landed, refuelled and kept on hammering away at 25 of the most vital Arab air-fields; some pilots flying as many as 8 sorties. The Israelis used a new weapon; a light-weight fragmentation bomb which accounts for the greater ranges over which they attacked. These bombs were fitted with a guidance system that enabled their pilots to deliver their loads with incredible accuracy. Pictures have revealed plane after plane smashed and burning. But that evening 400 war planes had been destroyed, thereby eliminating Arab air power. Egypt lost 300, Syria 60, Jordan 35 and Iraq 15. The Israelis lost 19 planes mostly downed by ground fire.

The Arabs lost another 50 fighters in dog-fights over the next two days at the cost of 3 Israeli planes. But tactically everything hinged on the single devastating air attack of the first day. Its results gave Israel three vital freedoms: the freedom of choice of objectives, the freedom of movement and the freedom from threat to the home front. It now became possible for them to execute their ground plans with immaculate perfection. As the initial air strikes were being executed, Israeli holding forces made quick thrusts on either side of Khan Yunis; the populated area of the Gaza Strip, and a feint thrust at the Syrians in the North, to pin down and neutralise these two sectors. Having achieved this, their offensive armour and infantry columns, organised once again into

three battle groups, and were ready to cross into the Sinai, while substantial reserves were poised to counter any moves from Jordan.

Observers have suggested that the Israeli operations in the Sinai were a carbon copy of 1956. This is not so. The Israelis followed the same routes because there were no others to follow, but apart from this similarity, there was little else they copied. Their initial thrusts into the Gaza Strip had penetrated into the extensive Egyptian anti-tank minefields. The first Israeli armoured column moved through this gap and turned westwards. Pressing on at full speed, they by-passed Rafah and El Arish. Leaving mounted infantry to surround these towns, the armoured columns turned southwards to threaten Abu Aweigila and Alauja from an unexpected direction.

The Israelis had hoped that Jordan would remain neutral, but by 11 a.m. on June 5, in response to a telephone plea from Nasser, Jordan opened a third front with heavy artillery and mortar shelling. The Israelis did not react to this, but after last light on June 5, two of their infantry columns supported by armour, encircled Jerusalem from the North and South. On the night of June 5-6, the Israelis secured Abu Aweigila by a parachute drop. At the same time, their second and third armoured groups crossed into the Middle and Southern Sectors of the Sinai. Moving at full speed at night they avoided contact and left small holding forces to contain the Egyptian garrisons at El Qusiema, Bir Hasna, El Kuntilla and El Thamad.

The dawn of June 6 found Israeli armoured columns deep in the Sinai speeding westwards on all three axes. They were supported by light spotter aircraft and helicopters and Arab skies were dominated by their fighters. Using their secret guided missile, Israeli pilots picked off Egyptian tanks and vehicles with deadly accuracy. Meanwhile, large Egyptian garrisons at Khan Kunis, Gaza and elsewhere at communication centres in the Middle and Southern Sectors were pinned down by small Israeli holding forces which continued to lob mortar and artillery shells into the Arab positions at regular intervals. In the Northern Sector, Israeli infantry and artillery reinforced their containing forces around El Arish which was subjected to heavy artillery and air attacks. The town fell into Israeli hands at 12.00 hours. Three hours later this was being used by their pilots as a forward air-base. At this time, Israeli infantry entered Jerusalem which had been evacuated by the Jordanians during the night.

By the evening of June 6, substantial Egyptian armoured forces had been bottled up in the Gaza Strip and elsewhere on the border. These could have presented a serious threat to the Israeli lines of communications in a long war. But by now it was probably apparent to the Arab

field commanders that they had lost the air war and with it their hopes of fighting a long war. It was then clear that the first day's air triumph would dictate the entire course of the battle. Egyptian morale had at no time in previous battles suggested a patient endurance of ruthless air attacks pressed closely home. Nor was it likely that their supplies could be long maintained by their soft vehicles in the circumstances which developed. On the other hand, Israeli offensive operations were immensely assisted by the possession of unimpeded reconnaissance by their lightspotter aircraft and helicopters. These were used to direct their own attack aircraft, tank columns and artillery fire unhampered by the need to look over their shoulders. Moreover, their transport aircraft could deliver all the ammunition and supplies that their forward troops needed without their having to eliminate the Arab strongholds which were still blocking the main access into the Sinai. Even the best troops are liable to crack under these conditions.

During the night of June 6-7, on the Jordanian front, Israeli motorised infantry supported by armour operated southwards from Jenin and eastwards to Nablus to secure key communication centres on the road network west of the Jordan river. On the Syrian front the Israelis remained on the defensive. In the Sinai, their armoured columns pressed relentlessly forward towards Bir Gifgafa and Mitla Pass. By daylight June 7, all Jordanian territory west of the river Jordan was in Israeli hands. Egyptian forces were still bottled up in the Gaza Strip and at El Qusiema but had withdrawn from elsewhere. By noon, Bir Gifgafa, the Egyptian Headquarters of the Sinai Forces, and Mitla Pass were in Israeli hands. By the evening of June 7, the Jordanians admitted defeat and accepted a cease-fire.

The Egyptians at first refused to lay down their arms. The Israelis had planned to use paratroopers also for the capture of Sherm El Sheikh, but the small Arab garrison there withdrew before action, and Israeli paratroopers were airlanded there unopposed. On the night of June 7-8, the garrison at El Qusiema broke contact and attempted to fight its way back to Suez. On June 8, Israeli armour and infantry forces which were holding Mitla Pass were subjected to heavy Egyptian counter-attacks both from the west and the east. Small Egyptian armoured groups and individual aircraft carried out suicide attacks suffering heavy losses. Egyptian tank crews fought with blind courage but to no avail. By the evening of June 8, Egypt accepted the cease-fire. Israel now turned her attention to the north. On the evening of June 8 and over the whole of June 9 they carried out a series of offensive actions against the Syrians. They drove them back from the heights, north of Galilee and penetrated 15 miles into Syria before agreeing to a cease-fire on June 10, thereby, bringing the campaign to a close.

Arab losses in manpower were staggering. Some 7500 Egyptians were killed and 18,000 captured of which, 11,000 were allowed to return. It seems that about 3000 specialists and trained leaders are not being sent back as promptly as was done the last time. Jordan announced the loss of 15,000 soldiers and civilians of which many were reportedly prisoners. About 3000 Iraqis and the same number of Syrian soldiers were killed or captured. All this for the loss of 679 Israelis killed, 2563 wounded and less than two dozen taken prisoner. The material losses sustained by the Arabs makes grim reading. 450 aircraft were destroyed which included bombers, fighter-bombers, fighters and transport aircraft. Some 700 tanks were destroyed and 200 captured in a usable condition. In addition, 10,000 military trucks of all types and four hundred 120 mm and 122 mm field guns were destroyed or captured.

### CONCLUSION

The first Sinai Campaign was conveniently, if not accurately referred to as the "100-Hour War". No doubt much will be written about this third action. Already some have begun to refer to it as the "70-Hour Miracle." Without in any way denying the superb leadership, organisation and performance of the Israeli army, we would do well to understand that Israel's devastating initial air-blows within two hours destroyed all chance of an Arab victory. Subsequent successes and failures must be judged in the light of this air triumph. To deride Arab arms by comparing their collapse to the North Vietnamese resistance in the face of US air-power is unfair. To speak of morale, offensive action and logistics as influencing factors is somewhat irrelevant under circumstances where Arab Armour, infantry and motor columns were sitting ducks for the Israeli air force in the open treeless wastes of the Sinai desert. The absolute necessity for air cover is the most important single lesson to be re-learned from this campaign.

The grim results of unrealistic military planning were apparent. The Arab armies believed that their initial defeats in the 1948 battles were because the ruling clique in Egypt was corrupt. Their defeat in the first Sinai Campaign was attributed not to the strength of the Israeli army but entirely to Anglo-French intervention. By fostering the myth that Israel by itself was no match for the Soviet-equipped Egyptian army and air force, Cairo not only under-estimated the Israelis but also fostered a dangerous complacency in their armed forces. They were convinced that the Israelis could not hope for a walk-over nor afford a long war; thus they felt certain that Israel could not dare to launch a pre-emptive attack. The Arabs became victims of their own myth.

What follows directly from this is the need for realistic military preparation. The Israelis were thoroughly prepared both materially and mentally. Contrary to popular impression, the Egyptians were not materially unprepared when the Israeli blitz came. They had radar, dummy planes, camouflage, dawn air-patrols, anti-aircraft guns on air-fields and surface-to-air missiles. But these were functioning in an atmosphere of mental

complacency. Thus, though they were well aware of the elementary requirements of security at any air-base in an emergency they failed to execute their precautionary measures realistically. Some of their planes were lined up as if for a display. They made no effort to cover radar gaps about which they were warned by friendly advisers several years before. They had also been advised to keep at least one squadron of planes constantly ready in the air—all this was ignored. A more fatal combination of military negligence and complacency cannot be easily imagined.

This campaign again emphasised the difference between 'tactical' and 'mental' mobility. Mental mobility is a nebulous term which represents the spirit of an army. If leaders do not have mobile minds, an army will not be able to apply the principles of mobility on the battlefield. This mental attitude to mobility is the basis of all tactical mobility. The Arab armies were well equipped with the means of mobility, yet, without mobile minds no true tactical mobility could be exerted. Conversely, developing nations would do well to remember that an army with little means can attain a high degree of tactical mobility if its leaders are imbued with a mental mobility, which can impart a drive to the most primitive war-machine. Nations which lack an advanced technological base have a special lesson to learn from this; guard against over-sophistication in the means of mobility until one is technically ready to handle such means. Military hardware is no substitute for effective leadership.

Lastly, the aspect of coordination. Overall coordination was superb in the Israeli army, which was lacking in their opponents. Like the European states facing Napoleon, the Arabs have from time to time formed alliances which looked more than enough to ensure victory on paper. But like Austria, Prussia and Russia of old, they have always been defeated by a well-coordinated mobile offensive army. Even whatever little chance the Arabs may have had to exercise a modicum of control at lower levels by means of radar or wireless communications was rendered helpless by superior Israeli technical know-how. Arab radar and wireless communications were "jammed" from the first hour of commencement of hostilities. This completely paralysed army field commanders and air force station commanders who were unable to issue effective orders, send information nor execute coordinated plans.

Israel's victory has brought her several problems. There are 25,000 Syrians in the area they occupy to the North of Galilee; another 800,000 including 450,000 Palestinian Arab refugees live on the west bank of the Jordan river; there are 450,000 Arabs including 315,000 Palestinian refugees in the Gaza Strip. Can the Jews take the security risk of absorbing them into their community? If not, then what? Today, Israelis' military dominance is real, but can only last as long as it will take the Arabs to borrow a new army and air force. Can this be avoided? Already the defeated Arab leaders have proclaimed that their ambition is to build up enough strength to eradicate Israel even if it takes generations

and another few defeats. They sound a little like Peter the Great, who remarked that he would force the Swedes to defeat the Russians until "they teach us how to beat them." But undoubtedly the Arabs will have learnt the lesson of Israel's air-strike. In the next battle it may be the Arabs who will carry out a pre-emptive strike. Can Israel ever ensure against this ? Whereas these may be considered long-term political problems, no planners can avoid the military implications arising from these questions in the future. Israel has won this third battle but who can say she has won the war ?



# MINIMUM DETERRENT —AN APPRECIATION

BY LIEUT-COLONEL R.D. PALSOKAR, MC

The bipolar super concentration of nuclear weapons has created a general feeling that the only nuclear threat to India's survival would be from a major nuclear war arising from a direct conflict between the US and the USSR. Such a war is almost entirely ruled out as a result of the present state of mutual deterrence and the apprehension of possible escalation leading to the destruction of the entire mankind. If anything, the two super powers have come closer together than ever before. Since a 'third party' nuclear power such as France, is an ally of one of the super powers, such nuclear polycentrism has not shaken the world confidence in the effectiveness of nuclear deterrence. But now a 'fourth party,' China, is aspiring to be a super power. She follows an independent but militant policy devoted to the spread of communism and is not an ally of either of the super powers. Within thirty-two months of her successfully joining the nuclear club, China exploded her first hydrogen bomb of several megaton range on June 17, 1967, thus confounding the estimates of her earlier progress. This coupled with the threatening posture of China ever since 1962 has created an entirely new type of situation which poses a threat to India's territorial integrity, national prestige and her democratic way of life. It is proposed to review such a situation based on available information pertaining to China's nuclear progress, her ideology, aims and aspirations in so far as they affect us. Since the defence policy of a country is interwoven with its foreign policy and both are limited by national resources and dependence on foreign powers, such an appreciation has perforce to take into consideration the political, military and economic factors.

This review will first discuss the threat in relation to a hypothetical yet probable situation and then examine the political and economic aspects of the courses open culminating in an outline plan.

The aim of the soldier as well as the politician, is to ensure that the safety, honour and welfare of his country are not endangered and this will be borne in mind throughout the appreciation.

## THE THREAT

### China's Nuclear Progress

CHINA exploded her first fission trigger device of 20 kiloton range at Lop Nor in Sinkiang on October 16, 1964 and thus became the fifth nuclear power of the world. The Chinese Government

announcing the great event issued a statement: "This is a major achievement of the Chinese people in their struggle to increase their national defence capability. To defend oneself is the inalienable right of every sovereign state..." It was soon known that the Chinese had managed to produce their own uranium-235 and had not used the relatively cheap reactor produced plutonium. Whilst the other nuclear powers had started by testing a plutonium bomb China had utilised uranium-235 which is suitable for the A-bomb trigger needed to set off a hydrogen bomb.

This first Chinese explosion was generally belittled as crude in the Western press. What use is an A-bomb, it was argued, if China did not have an effective delivery system which is so complex and so very expensive? The lead to minimising the importance of the Chinese bomb was given by President Johnson in his radio and television address on October 18, 1964. He commented that China had a long way to go from the first test to an effective weapon system.

On May 15, 1965, China exploded another 20 kiloton range device similar to the first one. About a year later on 9 May 1966, she exploded a third one—this time a fusion bomb containing thermonuclear materials. This last one was in the 100 to 130 kiloton range.

The Chinese test that went generally unnoticed in India was that held on October 27, 1966. This test did not create half the furore that was caused by the Pakistani acquisition of a few fighter jets from Iran. China then set off a nuclear-tipped guided missile with a range of about 400 miles. The Chinese certainly had confidence in this missile in that they allowed it to fly over their territory. The US assessment of China's missile might have, however, undergone a radical change. In an address to the NATO Ministerial Council on December 15, 1966, Mr. Robert McNamara, US Defence Secretary, said that in two years' time all Indian cities, industrial complexes and defence establishments within a 500 mile-range of Lhasa would be open to Chinese missile attack. He further added that in another 9 years time, i.e. by mid-seventies, no Indian city anywhere on the sub-continent would be safe from Chinese attacks either with medium range or inter-continental ballistic missiles. Work on these missiles was, according to him, progressing intensively.

According to the then French estimates as conveyed to the NATO ministers, Chinese medium range ballistic missiles were expected to become operational by 1967 and she was expected to be in a position to deploy several medium range ballistic missile launchers by 1968-69 and several dozens by 1976. The Chinese inter-continental ballistic missiles were expected to be deployed by 1975.

China carried out her fifth test, second fission bomb containing

thermonuclear materials on December 28, 1966. This bomb was believed to be in the 300 kiloton range. She exploded her first hydrogen bomb on June 17, 1967. Thus it may be assumed that all Indian targets within 500 miles of suitable launching sites on the Indo-Tibetan border are already within range of Chinese hydrogen bombs and the remainder would come within their range by 1975 or even earlier.

It is estimated that China has to date between 10 and 20 low yield atom bombs and she is producing them at the rate of about 12 a year.

### **Future possible progress**

In view of the considerable progress made by the Chinese there is every reason to revise the old estimates of her future possible progress. The *Guardian*, London, now predicts that the Chinese might produce an inter-continental missile within the next twelve months, i.e. by July 1968. If this prediction is considered over-optimistic, it may be correct to assume that in another five years time, China will be in a position to threaten any target in India, Pakistan, Burma and other countries on her periphery.

### **Tactical nuclear weapons**

No estimate or intelligence reports are forthcoming on China's developing tactical nuclear weapons. In view of her progress in nuclear technology, it may be assumed that she will be able to deploy in the field very low yield mortars, guns and missiles in another five to ten years time.

Since tactical nuclear weapon is a general term, available data on a few American and Russian weapons is given in the succeeding paragraphs.

Research is now in hand on making a nuclear "bullet" which will stop a tank. This will be the smallest nuclear weapon. If this bullet materialises, it will not be possible to distinguish between the conventional and the nuclear war.<sup>1</sup>

The Davy Crockett mortar XM 28 weighs 150 lbs and has a range of about 2200 yards. The heavier one XM 29 weighs 375 lbs and has a range of 4400 yards. Both these mortars compare with the 3-inch and 4.2-inch mortars in weight and range, but not in the projectile. The nuclear overheads of the Davy Crocketts are in the  $\frac{1}{4}$  to  $\frac{1}{2}$  kiloton range. One brigade in each NATO division has 10 such mortars.

The 155 mm howitzers and 8 inch towed howitzers have a range of over 10 miles and fire nuclear shells of 1 to 2 kiloton yield. These are divisional and corps artillery regiments. The 'Honest John' unguided

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(1) *Times of India*, September 2, 1966

rockets have a range of 10 or 12 miles and are integrated as divisional artillery. Each NATO division has two firing batteries with 4 launchers each. In addition there are guided missiles such as solid fuelled Sergeant missiles with an inertial navigation system. The ranges are upwards of 30 miles and the nuclear warhead yields between 10 and 60 kilotons.

There are smaller demolition weapons in service. The aircraft can also carry low yield missiles and fire them more accurately at pin-point targets.

The smallest tactical missile displayed in the 1957 May Day Parade in Moscow has a range of 10 miles and is mounted on a PT 76 amphibious chassis. It is possible that the Soviets lag in miniaturization technique and their fission triggers are cumbersome. But in the last ten years they may have made sufficient progress to put in service more battlefield nuclear weapons.

In an article in *Izvestia* dated 21st December 1963, Marshal Chuikov made the following statement:—

Our land forces possess their own nuclear weapons that include arms such as the Operational and Tactical Rocket Troops, which provide main firepower for routing the enemy. These troops are capable of hitting any objects at ranges of up to 500 KMs, and more if necessary, quickly creating a decisive change in the battle situation.

### **Fire Effect**

If the ten Davy Crocketts in an American Brigade fired air bursts in salvo, they can destroy dug-out positions about 2000 yards long. A battery of six 155 mm howitzers air bursting a 2 kiloton shells produces similar effects over a front of 6500 yards. If all the launchers of one of the Honest John batteries are fired, they can destroy all the dug-outs or tanks along 3000 yards frontage.<sup>2</sup>

### **Detection of nuclear explosions**

Nuclear explosions are detected either by the radio-active fall-out or by shock waves. Small size tactical weapons may escape detection by either of these two methods.<sup>3</sup> The fire-ball from a kiloton explosion near the ground normally rises to 13000 feet. In case of  $\frac{1}{2}$  kiloton explosion it will not rise even that high. In the Himalayan terrain, there are many valleys which will hide such explosions effectively.

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(2) Neville Brown: *Nuclear War*, Ch 12

(3) D. G. Arnott: *Our Nuclear Adventure*, Page 137

### **General information—Chinese forces**

China has the largest standing army of 2.3 millions, an air force of over 1500 MIGs and unaccounted para-military forces. Fifteen of her army divisions are stationed in Tibet.

The Chinese have the world's largest submarine fleet. A Chinese missile-firing submarine with three launchers has already become operational.

### **Chinese aims and aspirations**

China is spending a fortune to arm herself with nuclear weapons and building up a missile system to carry these weapons. Why is China developing the nuclear weapons? She is not certainly doing so merely to prove to the world that her 'great proletarian cultural revolution' based on Chairman Mao's thoughts is yielding results. There must be more than one reason to goad her leaders to give priority to nuclear arms at the expense of economic development.

### **The ultimate aim**

The ultimate aim of all good communists is worldwide triumph of communism. Mr. Mao wants to establish a Marxist puritan society, not the 'revisionist' Russian type. The Russians have given up the idea of forcible conversion of nations to communism. They now believe in and practice co-existence, but not the Maoists. The Maoists have taken to themselves the right to represent the revolution.

The hydrogen bomb is the status symbol of super powers. China has got it. A first-rate military power cannot depend on other nations. China achieved economic and political independence from Russia ever since 1963. Mr. Mao believes that an all-out nuclear war is disastrous but the Chinese can recover from it. In such an eventuality China will emerge victorious because the Chinese are scattered in the plains in small villages and in the hills in little hamlets. All of them can never be destroyed in an all-out nuclear holocaust. Hence nuclear war need not be feared.

But the ultimate aim cannot be achieved unless China scores victory over the U.S. The Chinese surely realise that they cannot win a war with the US in the immediate future. They have, however, succeeded in making the war costlier for the Americans. The Chinese may also reconcile to 'co-existence' when they succeed in raising the standard of the common man. But this does not appear possible in the lifetime of Mr. Mao who is already 72. To bring his people together and to hold his position in his country, Mr. Mao definitely has set the goal of world revolution before his countrymen.

The ultimate aim is a long way off. China with her military weakness and nuclear inferiority is not yet prepared for a direct confrontation with the United States with her vast nuclear arsenal backed by an efficient military establishment and a highly organised industry. This is a deterrent to China's ambitions and her dream to be the Super Power of the world.

In the intervening period she must have set herself some stagewise aims.

### **Stagewise aims**

To secure dominant influence in developing nations wearing the disguise of the natural militant leader and agitator of the poor and hungry would fit in as the aim of the first stage. Concurrently, China would strive to remove American and Russian influence from her periphery. The next stage would involve the establishment of satellite communist governments to expand her sphere of influence and so on.

Pakistan should be no exception to this. Millions of copies of 'Mao's thoughts' are being sold now in Pakistan at throw-away prices. There is no ideological common ground between Pakistan and China. The only reason for their strange friendship is their common aim to weaken India. Once China succeeds in converting India to her way, the next casualty will be Pakistan. Conciliation of Pakistan is but a temporary phase.

A sub-stage aim would be to dominate border areas by a combination of subversion, guerrilla warfare and the threat of attack by a large manpower army or a limited attack to achieve a limited aim without evoking US response. Any strategic strike deep into Indian territory with the newly acquired nuclear weapons will not serve Chinese aim, as it will certainly evoke massive US intervention and hence it is ruled out.

One method could be to foment trouble in a selected border area with the help of some local revolutionary clients. The trouble-makers are encouraged to form a government in exile or the world is told that they have actually done so. Troops can then be sent on 'request' of this government to help rehabilitate it in its own 'country'. A pre-condition to such an operation is that it must be conducted with speed so that the rest of the world is presented with a *fait accompli*. An impression needs to be created that the domestic conflict will widen only if the US interferes.

The Russians will find it extremely difficult to intervene. If they supported the border country—India in this case—they would deal a further blow to the international communist movement. If they aided

the local communist insurgents, they would only help further Chinese sphere of influence, and incur the wrath of the non-aligned nationalists. It is for this reason that Mr. Khrushchev had to describe the 1962 conflict as between his Chinese brothers and Indian friends.

China will not be unduly worried by the reaction of other non-aligned nations. Those which are on the borders of China will have to learn to live with the Chinese as well as draw appropriate lessons from this example. Those which are away at a distance will not be prepared to give up their economic development, expand their armies and go to the aid of an already lost cause.

### **The aim plus**

Each sub-stage aim must have an aim plus—help spread communism through Mao's thoughts. A badminton champion who wins a game, a swimmer who comes first, a worker who achieves a record, or anyone who does anything especially remarkable is made to say that he could do it only because he was inspired by Chairman Mao's thoughts. The aim plus helps towards quicker attainment of the ultimate aim.

How do the aims of the Chinese who may shortly be armed with tactical nuclear weapons affect us? We will examine a hypothetical yet probable situation and consider the factors having a bearing on it.

### **A HYPOTHETICAL SITUATION**

Siliguri sub-division in West Bengal is a sensitive area of strategic importance. It is bounded in the North by Sikkim through which pass the two traditional ancient trade routes between Tibet and India, one via Nathu La and Gangtok, and the other via Jelep La and Kalimpong. Both the routes converge in the area of Kalimpong. The Siliguri plains are just South of Kalimpong. In the South is East Pakistan barely 10 miles away. Nepal and Bhutan are due West and East respectively. The vital rail and road links to Assam pass through this narrow stretch of land where the rivers run from South to North.

Highly trained Indian army and Air Force units are maintaining vigil in Sikkim. The troops are trained in conventional warfare and are armed with the best available non-nuclear weapons. The Chinese have built a good road right to the border in Nathu La area and large Chinese forces are stationed in the Chumbi valley just across the border.

Trouble is brewing in this area. Fairly disturbed conditions exist in Naga Hills and Mizo districts. The topography and vegetation are ideal for the guerrilla fighter. According to Moshe Dayan, the guerrilla requires two additional conditions the friendship of the population and the backing of a sovereign neighbouring power. If the local popula-

tion is not friendly, it can be terrorised into giving help. In this case, the guerrillas will have the backing of two sovereign neighbouring powers, viz. China and Pakistan. They can find bases in either and can depend on their active help in securing arms, ammunition and money.

Let us imagine that trouble is engineered in this area and guerrillas are active. The army has taken on the additional commitment of bringing these guerrillas under check in addition to her commitments of guarding the borders with China and East Pakistan. A pro-Peking government in exile has been formed in the name of some living persons or under fictitious Indian names. This government asks the Peking government to come to her aid. The Chinese armies on the border are equipped with tactical nuclear weapons. The Indian Army is much stronger in conventional weapons, and better trained to fight in mountainous terrain. The Army's dispositions are well balanced but neither the Army nor the Air Force are equipped with tactical nuclear weapons. India stands non-aligned, and 'determined to pursue in every possible manner the objectives of general and complete disarmament, including prohibition of use of nuclear power for non-peaceful purposes.'<sup>(4)</sup>

The Chinese Government declares to the world that she has decided to help establish the government in exile in its proper place at Siliguri, and that her intention is to withdraw her troops to her territory leaving behind a few advisers. China strikes across the Nathu La/Jelep La passes with her nuclear-tipped mortar and artillery projectiles. She does not use the long range everkill missiles and her air-force. She sets for herself a limited sub-stage aim employs limited weapons and limits the scale by asking Pakistan not to attack. She hopes the operation will be over in 48 to 72 hours. China denies most vehemently that she used tactical nuclear weapons in support of her land forces. The high mountains and low valleys of Sikkim make the task of detection of very low yield atomic explosions doubly difficult and the world does not quite know whether to believe or disbelieve the Chinese.<sup>(5)</sup>

### **Examination of the Situation**

It may be argued that the above hypothetical situation is a figment of imagination and is never likely to occur. India need not therefore worry about it and the Army may not plan for any such eventuality. Such

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(4) Foreign Affairs Policy Resolution, AICC, November, 7-8, 1964.

(5) Another similar situation would be the Chinese occupation of Bhutan. As early as 1939, Mr. Mao Tse-tung had said that Bhutan was one of the dependent states and territories taken by the foreigners from the Chinese. Such an occupation would shut off Assam from India, and give control of NEFA to China. The terrain in Bhutan is such that the rest of the world would never know if China used tactical nuclear weapons to support her advancing armies which are bound to be opposed by the Indian Army and the Air Force.



an argument is basically unsound. The country must be prepared to face all possible eventualities and this is but one of them.

Though it may be accepted that such a situation is likely to develop it may be argued that the Indian Army will be able to stem the Chinese penetration and instead inflict heavy casualties on the Chinese—sufficient to deter them from further thoughts of aggression. A quick appreciation of the ground and relative strength factors will show that the army will not be able to fight the Chinese onslaught. Atomic explosions in the valleys destroy the existing roads, dug-outs and troops deployed for the defence of certain routes. There will be no comparison in the fire-power of the opposing forces. A 3-inch mortar carries a bomb weighing 10 lbs. A 4.2-inch mortar bomb weighs 20 lbs. and a 25 pounder shell 25 lbs. The explosive contents are less than 10, 20 and 25 lbs of TNT. The Davy Crockett mortar of the 3-inch type throws a projectile equivalent of 250 to 500 tons of TNT. The latter is 50,000 to 100,000 tons as powerful as its counterpart or as compared to a medium/heavy conventional gun shell.

The obvious deduction will then be that the Indian Army armed with conventional weapons will not be able to oppose successfully one which has tactical nuclear weapons to support it. The Indian Army is not trained for any such eventuality either.

### THE THREAT

This then is the threat—the threat of carefully limited war on India's sensitive borders covertly supported by tactical nuclear weapons, and waged with speed, without provoking Washington and with Moscow's chagrined connivance.

### POLITICAL AND ECONOMIC CONSIDERATIONS

#### Irresponsible Behaviour Pattern

The French argue that independent nuclear forces should contribute to general stability provided that the threat of these forces is not used in an irresponsible manner. The stability provided by the nuclear weapon is attainable only between *reasonable powers*.<sup>6</sup>

If the present behaviour of the Chinese leaders is any indication it may be said quite categorically that they are not certainly behaving in a responsible manner. If anything, they are displaying signs of acute neurosis. At home, they have branded their own Head of the State as a traitor, and let off young hoodlums against the established order in the name of a cultural revolution. They are heaping insults and injuries on

(6) Beaufre, A. : *Deterrence and Strategy*, Chapter, 3.

the Russians every day. They abused the diplomats of Russia, Burma, Britain and India not very long ago. They engineered trouble in Hong-kong and warned the British that they would tremble before the Chinese people. In Burma, they accused the Ne Win Government of instigating an outrage of white terror against the Chinese. The Red Guards attacked the Japanese communist party representatives in Peking and the Mongolian embassy. Outer-Mongolia has practically broken off relations with China. They have picked a quarrel with a peaceful country such as Nepal and accused that government of conspiring with the imperialists. The Chinese are interfering in India's internal matters by openly instigating the trouble-makers in Naxalbari.

Since the Bandung Conference in 1955, China was following a policy of 'peaceful co-existence' with her Asian neighbours. The only notable exception to this was India since the 1962 Chinese attack. The present behaviour of the Chinese certainly points to a change in their previous policy. Whether this change is due to the Chinese leaders convincing themselves with their own propaganda that all the countries on China's periphery are now itching to embrace communism or it is due to their isolation from the rest of the world, it does point to an extremely irresponsible and irrational behaviour pattern.

### NUCLEAR GUARANTEE

If China is not a reasonable power and is likely to use tactical nuclear weapons, it is suggested that India should seek nuclear guarantee(s) from one or both the Super Powers. She will then be able to devote herself to her primary task of nation building and social welfare.

A joint nuclear guarantee is meaningless in actual practice. The national and other vital interests of the two Super Powers are diametrically opposite. How can they agree to act in concert when it comes to dealing with China? A guarantee, after all, involves bombing China with nuclear weapons should she use nuclear weapons against India. The USSR taking up nuclear cudgels against the brother communist Chinese is unthinkable when both profess to have a common aim. Should they do so, they will completely disrupt the world communist movement and may deal a mortal blow to their leadership of the movement. A joint guarantee also infers that both the Super Powers have a common China policy. It is elementary that they do not.

India is a distant country to the US both physically and emotionally. It is doubtful if the US would agree to giving a specific guarantee to such a far away land covering doubtful tactical nuclear strikes. The US with its world commitments will retaliate only if her national interests are in jeopardy. She will give vague guarantees such as the one given by President Johnson on October 18, 1964: "The nations that do not

seek national nuclear weapons can be sure that if they need our strong support against some threat of nuclear blackmail, they will have it."

However, a specific guarantee, covering even doubtful cases discussed above, will be workable but not acceptable to India. It will be against our policy of non-alignment. Moreover, such a guarantee will involve our surrendering some sovereign rights and giving reciprocal concessions to the guarantor. Permission may have to be given to build suitable installations or to station US troops armed with nuclear weapons on Indian soil like the US stationing a number of divisions in Europe. In a democracy such as ours, and in the present mood of Indian politics, the Parliament is not likely to accept such a proposal.

The guarantee that may work is the firm Chinese conviction that the US will retaliate with nuclear weapons should they attack India. The Chinese will be convinced if they see that the US is utterly involved in Indian affairs. Since Washington cannot get committed to India's defence the way it is to Europe's, this type of a guarantee is unlikely to materialise.

When Mr. Levi Eshkol, the Israeli Prime Minister was interviewed by the West German News Magazine *Der Spiegel*, he said: "what is a guarantee in this 20th century?" Referring to his conversation with President Johnson, he continued: "If Egypt attacks us and we send a telegram, Mr. President, you perhaps may be busy with Vietnam and then you will say, 'just a moment.' I must send some one to see what the trouble is and who fired the first shot. Or, Mr. President, perhaps you will be somewhere in Texas hunting; or you might be sick. One or two or three days are enough to destroy Israel. So what is the guarantee?" If China continued to deny most emphatically that she did not use tactical nuclear weapons, India may not even be able to revoke the guarantee.

Any nuclear guarantee will make India permanently dependent on foreign power(s) for her defence and needs to be discarded if for no other reason. And what guarantee is there that such a guarantee will remain operative if Peking is covertly backed by Moscow? *In fact, should Peking and Moscow evolve a common US policy India's security will be entirely at the mercy of Peking unless India has her own minimum nuclear deterrent to meet the type of threat already discussed above.*

## MINIMUM DETERRENT

### Courses open

If India cannot depend on China's sweet reasonableness not to use tactical nuclear weapons or on a nuclear guarantee by one or both the Super Powers, she must have a small nuclear capability of her own to

meet the type of threat she will be faced with. This will be an effective self-defence.

Strategic nuclear strikes against Indian cities by China are ruled out as China will then become an enemy of the rest of the world. She will also evoke US reaction. If the US does not react, she will stultify her own nuclear deterrent and expose herself to similar nuclear blackmail.

All defence must perforce be offensive. There will be a desire on the part of the General Staff to work out the distances from Indian bases to distant targets in China and then make out a case for a limited nuclear capability of attacking targets that are not too distant with a modest force of plutonium warheads and a missile delivery system or for a sophisticated programme with thermonuclear weapons. If India indulges in such an attack or even prepares for it she will instead become an enemy of the rest of the world and a menace to world peace. That surely is not the aim. To restate, it is to ensure that the territorial integrity of the country is not endangered. The correct course to follow would then be to equip the defence services with tactical nuclear weapons.

## ESCALATION

### **Advantages/disadvantages**

It is argued that tactical nuclear weapons will not be used on a battlefield because of fear of escalation into a general conflagration. There is, therefore, no need to equip armies with low yield weapons which have only limited and tactical use only.

The Chinese do not subscribe to this theory. They still believe in sub-limited wars as instruments of continuation of their political policy. According to them a number of opportunities exist where they could support directly or indirectly wars of national liberation or revolutionary civil wars. They opine that such wars will not escalate into a general war. They are, therefore, prepared to take greater risks and expect greater dividends. They argue that the US will not dare to use nuclear weapons against them for fear of Soviet intervention retaliation. In the 1962 operation, they did not use their air force, withdrew to their territory and did not allow that conflict to escalate.

The Soviets in their dialectic with the Chinese always insisted that local wars involving nuclear powers will escalate into a general war. Their aim then was to prevail upon the Chinese not to go nuclear.

The Western countries contend that an operation of war can be limited by its aim, weapons and scale. Escalation is not an automatic process. It can be controlled. After all, the aim of deliberate escalation will be to prevent the worst paroxysm. In his address to the Commonwealth Press Union on June 20, 1961, General Norstad stated that

tactical nuclear weapons can be used on the battlefield in a controlled and selective fashion.

### **An arms race**

It is contended that if India decides to go nuclear, the country inevitably enters an arms race. China will be provoked to manufacture more nuclear weapons and Pakistan which has a nuclear potential will either acquire nuclear arms or will herself manufacture them in due course. China may even supply them to Pakistan. India will then have to possess more and deadlier nuclear weapons including a complex delivery system and counter measures against nuclear attacks. Finally, India will not be respected but feared and suspected by neighbouring countries.

A certain degree of arms race is inevitable. Today it is confined to conventional weapons. As nuclear technology gets cheaper, it will extend to nuclear weapons. It must. The reason is simple enough. All power comes from arms. To give up arms means to give up power. No nation wants to give up power. Arms are getting deadlier. Nations cannot do without them. Retention of power without arms is not possible.

Pakistan is a sovereign state ruled by a dictator. There is no power which can stop her if she decides to go nuclear. She has the nuclear potential and she does not have to convince her people that she should manufacture nuclear weapons before embarking on such a project. She has an ambition vis-a-vis India. If in the 1965 conflict she had tactical nuclear weapons at her command, she would have used them to achieve victory. There was a certain frenzy running through that country then which would have brought about such a decision. The only way she can now hope to conquer Kashmir is by posing a serious threat to India. And what could be deadlier than the threat of a nuclear attack? India did not provoke China to manufacture nuclear arms. China did it on her own. Given due time, Pakistan will also do it.

India will not lose any respect nor will she be feared if she arms her defence forces with tactical nuclear weapons. It is the political ideology of the government which creates respect or fear. A democratic China will not be feared even if she possessed the latest in nuclear arms. A militant communist China pursuing the path of spreading communism by subversion and violent means was dreaded even when she did not possess nuclear arms a few years ago.

### **Nuclear proliferation**

A certain degree of nuclear proliferation has also to be accepted. The Super Powers could not stop France and Communist China from

possessing the nuclear weapons. The Nuclear Test Ban treaty is no bar to acquiring the weapons.<sup>7</sup>

The Chinese views on nuclear proliferation are on the following lines:—

The prohibition of nuclear weapons will be possible only when more or all countries possess them....It is the business of every country in the world to decide for itself whether to develop nuclear weapons or not... It is a typical advocacy of imperialists to classify countries in the world as protectors or protectorates in accordance with having nuclear weapons.....In either case, such 'protection' violates the sovereignty and interests of the non-nuclear countries and makes their people nuclear slaves.....<sup>8</sup>

It will be in the interests of the Super Powers if India possessed her own minimum nuclear deterrent. Discussing the strategic aspects of the military balance in Asia in the context of Chinese involvement, Major General D.K. Palit has reached a similar conclusion. He says: "On the other hand, the realisation must come sooner or later to the stable democracies in Asia that the stage has been reached when an Asian nation must accept that responsibility—either that or they must be prepared to abdicate the right to strategic (and therefore, to an extent, political) decision-making, and accept the nuclear cover of Britain or perhaps France. Whatever the decision, the Super Powers must obviously endorse the arrangement. And it is for them to consider whether the decision should be taken now, when there is still time, or a negative strategy be permitted to develop and the stability in Asia be forever conditional on Chinese good will".<sup>9</sup> The General Officer has in effect stated clearly that India should go ahead with the manufacture of nuclear weapons not so much for tactical reasons as for strategic considerations.

### INDIA'S STAND ON THE USE OF NUCLEAR POWER

India was the first country to suggest in the United Nations that atomic energy should be used only for peaceful purposes. Immediately after the first ever hydrogen bomb test, Mr. Nehru made a statement in the Lok Sabha on April 2, 1954 reiterating India's stand. On November 27, 1957, he appealed to the US and USSR to stop all nuclear test explosions and to proceed to bring about effective disarmament. Our representatives consistently pleaded for ending nuclear test explosions

(7) This treaty does NOT ban underground nuclear test. Article 1 of the treaty states: "Each of the parties to this treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon's test explosion, or any other nuclear explosion at any place under its jurisdiction or control in atmosphere beyond its limits, including outer space; or under water, including territorial waters or high seas....."

(8) *Peoples Daily*, November 15, 1966.

(9) Maj.-Gen. DK Palit ; *War in the Deterrent Age*, Ch. 10.

in the Geneva disarmament conference. In the then circumstances, this was the correct policy for the nation to follow.

When the Nuclear Test Ban treaty was concluded between the US, USSR and UK on August 5, 1963, India was one of the first countries to sign it.

It is felt in many quarters that India's stand against the manufacture of nuclear weapons and our efforts to secure non-proliferation and nuclear disarmament have created respect for us in the world. But respect alone is not good enough if we are threatened with a nuclear attack.

Fortunately there has been a slight shift in India's position. "Whatever policy we may lay down, the art of conducting foreign affairs of a country consists in finding out what is most advantageous to that country. We propose to look after India's interests in the context of world cooperation and world peace in so far as world peace can be preserved",<sup>10</sup> Possibly in the context of this policy, Mr. Shastri, whilst replying to a question during the foreign affairs debate in the Lok Sabha on November 23-24, 1964, reiterated the Government's policy of not making the bomb but did add that he could give no guarantee for the future. During the Durgapur Congress Session, the Prime Minister similarly qualified his speech that India should not make nuclear weapons "at present". Similar statements have been made by Mr. Chagla also recently.

### THE COST

India already possesses a certain nuclear capability. The Canada-India Reactor at Trombay with a power rating of 40 thermal megawatts has the potentiality of making two twenty kiloton range bombs a year. The figures for those under construction are: Tarapore—76, Rajasthan—40, Madras—80. By 1972 India can make 230 twenty kiloton range bombs if she turned over her nuclear plants to making military plutonium.<sup>11</sup>

Varied estimates of the cost of production of such bombs have been given. Mr. Shastri quoted the cost as 14, 21, 40, 50 crores in the Lok Sabha on November 24, 1964. Quoting the study of L. Beaton, Major General D. Som Dutt estimates that the cost of a minimal capacity—50 plutonium bombs accrued at the rate of five a year, without a specialised or long-range delivery system would be around 500 million dollars in ten years, i.e. 50 million dollars a year for ten years.<sup>12</sup> This works out to less than five per cent of India's defence budget and is clearly within India's economic means.

A modern delivery system is based either on bombers or on rockets. The bombers may be subsonic or supersonic, manned or unmanned. The

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(10) Mr. Nehru's statement on foreign affairs and non-alignment in the Constituent Assembly, December 4, 1947.

(11) L. Beaton; Press Conference, November 20, '66.

(12) Adelphi Paper No. 30, Institute of Strategic Studies.

rockets are of two types—mobile or fixed base. India already possesses bombers. As discussed earlier, *she does not need to possess sophisticated rockets which are extremely expensive* and do not have particularly long life in service.

Such a nuclear bliss will not spell economic ruin.

### REACTION OF SUPER POWERS

When China decided to go ahead with the manufacture of nuclear weapons, the Soviets argued that the Chinese could rely on the Soviet nuclear shield. The Chinese replied that the Soviet military power served no other purpose than the foreign policy interests and self-preservation of the Soviet Union. When John Dixon, the Australian television producer asked Marshal Chen Yi why Peking wanted to develop its own atomic weapons in view of Soviet assurances to defend China, Chen Yi answered: "What is this Soviet assurance worth? This sort of promise is easy to make, but ...worthless. Soviet protection is worth nothing to us. No outsiders can give us protection, in fact, because they always attach conditions and want to control us."<sup>13</sup>

The Soviets tried their best to prevent China from going nuclear. Now both the Americans and the Soviets would bring pressure on India to prevent her from following suit. But it will be seen from the above discussion that it will be clearly in the interests of the Super Powers if India relied in the first place on her own defence capability and then, and only then, on assistance from other nuclear powers.

### CONCLUSION

China has made considerable progress in acquiring nuclear capability. If the rate of her progress to date is any indication, it may be assumed that a few years hence, she will equip her armies with tactical nuclear weapons of  $\frac{1}{4}$  to 1 kiloton yield. Such weapons do not radically differ in size and weight from the service mortars and guns but carry a projectile which is 50,000 to 100,000 times more powerful. The use of such weapons on the battlefield cannot be detected by outside powers, more so if they are used in the Himalayan terrain. An army equipped with conventional weapons cannot withstand an attack supported by such weapons.

China under the present leadership has not proved herself to be a reasonable power. If anything, her leaders appear to suffer from an acute neurosis. They do not hide their chagrin and are impatient with the USSR and all the other communist nations for their bearing up with the US. They do not believe in co-existence and want to establish a puritan Marxist society by world revolution. They are doing this by giving indirect



aid to local misguided people. Soon they will give them direct aid. Pakistan will be no exception to the Chinese ambitions.

A war can be limited by its aim, and scope. Escalation is not an automatic process. Any Chinese limited aggression against India will place the Russians on the horns of a dilemma. The US response will be conditional. If the Chinese deny having used tactical nuclear weapons, India's losing a few thousand square miles may not be an adequate reason for the US to step in. But damage to India's territorial integrity will have been done.

The only deterrent to the Chinese will be India acquiring tactical nuclear weapons. She need not possess any sophisticated delivery system. That care is being taken by the Super Powers in their own interests. The cost of manufacturing such weapons system is within the economic means of the country. A stronger India will be an effective check to China and will be able to contribute towards the common aim of preservation of world peace.

# SHOULD INDIA UNIFY HER ARMED FORCES ?

By COMMANDER K. SRIDHARAN

**T**HREE years ago a Canadian White Paper on the Integration/Unification of that country's Armed Forces was placed before its parliament. After what seemed an endless debate on a highly controversial subject, the bill was brought to its successful conclusion on 25th April, 1967. This bold step has been backed by the Canadian House of Commons with a vote of 127 to 73.

## CANADA'S CONCEPT

The Canadian Defence Minister, Paul Hellyer, was the main architect to have planned the integration of the Army, Navy and the Air Force into one Unified Force, with a single Chief of Defence Staff and a combined Defence Staff.

For a country like Canada, which has not only her own defence to think of but also international military commitments to honour, to have ventured into this new concept, goes to show that reasons for unification heavily outweigh the shortcomings.

## REASONS

What are the reasons that led to this radical change from the traditional defence structure, followed all the world over?

### (a) **Unity of Command and Control**

In the context of a total war, the unity of command and control assumes a much greater importance today than ever before. In a war of tomorrow, complete coordination can be best achieved if command of the fighting forces, at national, strategic and tactical levels, is vested in a single person, rather than in three different, sometimes differing, persons.

### (b) **Responsive Decision-making**

The unification would permit of a quicker and more responsive decision-making, as it would eliminate multiple channels and Inter-Service Committees.

### (c) **Mobility**

A unified force of land, sea and air, makes it more self-contained at combat levels, and by its very formation is germane to independent action. Unification in command structure with emphasis on functional basis, as opposed to static organisation with individual Service control, would lead to mobility.

**(d) Unity of Purpose**

The parochialism within the Army, Navy and Air Force, tends to exaggerate the relative importance of one over the other, and in the process the military thinking exhibits a lack of that unity of purpose so vital in defence planning. In other words, unification converts divisive attitude to a decisive approach.

Field Marshal Viscount Montgomery commented thus :

*It is a grave question, whether any large military organisation which is not closely integrated and gripped tightly at the top can adapt itself successfully to the required speed of modern life. If this is not done, the lack of adaptability of the organisation as a whole will tend continuously to promote individual service interests over those of the nation concerned.*

**(e) Common Doctrine**

Despite all efforts to inculcate common doctrine at joint staff colleges and other inter-service institutions, the soldier, sailor and the airmen do not always "talk the same language". A commonality achieved in training will lead to common concepts.

**(f) Common Conditions of Service**

Not only a semantic process is achieved, they will have the same terms of engagement, conditions of service and equal opportunities for advancement. This will eliminate inter-service disparities, open up better avenues for promotion in the large combined cadre.

**(g) Reduction in Costs**

By unification there is an obvious saving of overheads at Staff and Headquarters levels and in the logistic support personnel at most levels. The infra-structure of the defence organisation is kept down to reasonable limits. In the final analysis, if the same defence preparedness and efficiency are achieved at a lower budget the better. The saving made in the reorganisation could be better utilised on more modern equipment within the limited budget than is otherwise possible.

**Opposition**

The new Canadian concept had its share of opposition in the form of die-hards and conservatives, who called the protagonists doctrinaires and non-conformists of the world order. One of the main criticisms was that technical training of, say an Air Force pilot and a naval navigator could never be common. This objection was met by Hellyer thus: "A line naval officer will never be assigned to pilot an aircraft nor a pilot be made a tank commander. Obviously, environmental integrity will be maintained. At the same time, in career progression, many of these officers should be able to fill a non-technical staff assignment in any military climate, land, sea or air."

## INDIAN ARMED FORCES

Many nations are watching Canada's experiment with a critical eye. Norway, Greece, Turkey and New Zealand are reported to have shown a keen interest. It is a particularly attractive proposition to countries like India with limited armed forces and a moderate defence budget.

### Partial Integration

Integration in the Indian Armed Forces is not, by any means, a new concept. We are, in fact, more integrated than the armed forces of many other nations. Our cadets in the National Defence Academy have common basic training for three years, perhaps one of the few to do so in the world today. Our Armed Forces Medical Service is completely integrated. Our Defence Service Staff College imparts, by and large, common training to all the three Services under one roof. We have a single National Defence College, as Canada has; Air Chief Marshal Miller, Chief of Defence Staff of Canada, attributes this as a reason for a better understanding in his country of the real import of integration at higher levels.

We have also to some extent succeeded in appointing officers of the Army, Navy and Air Force to hold in rotation Inter-Service jobs. Moreover, we have officers of the three Services working most amicably in inter-Service Organisations, such as the National Cadet Corps, Movement Control, Cabinet Secretariat and so on.

### Enlarge Integration

We are thus already partially integrated. Why not enlarge the areas of integration? For instance, there is no reason why Air Force Recruiting cannot be combined with the already joint Army and Naval Recruiting Organisation.

If the Armed Forces Civilian Officers at the headquarters could today, with efficiency, rotate from one Headquarters to the other, is there any reason why at similar levels uniformed officers cannot ?

Our parliament has already given assent to the preparation of a Unified Code, combining the Army, Navy and Air Force Acts. When this is completed, we could as well have a common Armed Forces Judge Advocate Branch.

Certain of the logistic staff of the three Armed Forces at higher echelons could, with advantage, be combined. The functional commonality between the Army Ordnance & Supply Corps, Naval Armament and Supply Branches, and Air Force Equipment & Administrative Branches, strikes one as areas where such an integration could be attempted in stages. The bulk procurement of victuals is now made by the Army for the other

two Services; this is a typical area which is susceptible of integration. If we look for them there are many such areas.

Coming to technical branches, take an Engineer in the Army, Navy or the Air Force. The requirement is that he must basically be an Engineer, which can be achieved with common training, and subsequently he specialises in civil, mechanical, electrical, electronic, marine or aeronautical engineering. Unification beyond this broad specialisation would lead us into difficulty. The Canadians themselves are not attempting it.

The more we combine, the more versatile we will be. The more versatile we are, the more appointable we will become. The more appointable we are, the more flexible will be our organisation. Flexibility begets efficiency.

### **Avoidance of Triplication**

There is no gainsaying the fact that a lot of triplication can be avoided; training effort up to certain basic levels can be combined.

Even in simple administrative matters of passing orders of the Government, we have today separate Army, Navy and Air Force Instructions, promulgated with identical wordings. If terms and conditions of service, pay and rank structures are common, there will be no need for triplication.

We take a proposal today to Government and the case gets turned down with two stock magical words: "Inter-service repercussion." Think of the day these words are no more there in the armoury of those who use them !

### **Complete Unification**

I do not advocate that complete unification should be attempted, as certain areas are not intrinsically suited for unification—at least not as yet. The attitude towards our entire defence philosophy would require a re-orientation; the climate has to be created for such a change.

### **Psychological Factors**

The outward manifestations, such as the uniform, badges of rank and the like, can certainly be made common, which go to prepare people psychologically for a change. The Canadians have evolved a common rank structure and a single uniform in charcoal green.

We, Indians, are born traditionalists, and highly suspicious of change, although we are in a fast changing world. We accept change, but only gradually as our minds slowly get conditioned to absorb it. Major

General F.F. Worthington, one of Canada's oldest Generals, talking of the opposition to unification in his country, remarked :

*"The testimony of most of these experts had a disturbingly familiar theme; what was good enough for the last war will be good enough for the next. It is my opinion that at the end of every large war the existing Generals should be thanked, decorated and pensioned off. Put up statues if you will, but don't let them meddle with the future organization of the Service. Hand that responsibility over to the young, fighting Colonels who had to fight the war with the weapons at hand."*

We need not go to such extremes, but there should be an awareness to the necessity for a change and the courage to break away from sentiments.

### CONCLUSION

The die is cast by Canada which has set herself the goal of complete unification by the end of a Military generation. All eyes are on that nation's armed forces.

It has set other nations thinking. Let us also contemplate, cogitate and conclude on the implications of this radical step and how far we could go in unifying our Armed Forces to our best advantage. I am one of those who believe that we can implement, in the near future, integration in some conducive areas; further unification can be carried out at later stages in areas where commonalty exists. Complete unification of our Armed Forces, if it should come about at all, will certainly not be in this century.

# POLITICAL GAMING—AN APPLICATION OF WAR GAMING AND SIMULATION TECHNIQUE

BY INDU PRAKASH

THE recent technological development and the growth of organisational complex have made the educational exercise a very costly affair. With a view to training the manpower most economically in terms of time and money and for the development of new equipments like gigantic rockets for launching satellites and space vehicles it has almost become impossible for any country to subject it to actual firing. Similarly if a soldier is required to be trained to fire anti-tank missile accurately, he is supposed to be given enough training. The firing of 1000 rounds from a rifle by a recruit will only cost about Rs. 650.00 but for training a soldier for firing anti-tank missile will involve firing 100 shots costing about one lakh rupees. These 100 shots which are required to attain the desired level of performance, may not even be required by this trained soldier to fire in his whole career. In order to make this training cheaper efforts have been made to develop certain devices which represent the actual equipments. These devices are called Simulators by the use of which a soldier is able to attain a certain desired level of performance on the equipment without actually firing them as required in the battle.

Similarly a military Commander evolves certain war tactics for the future engagements based on the information details available regarding terrain, equipment capability, etc. For this he may use models, templates, etc. Thus without actually fighting and firing, the battlefield situation is analysed, new tactics are developed for getting optimum gains.

## SIGNIFICANCE OF GAMING TECHNIQUES

In recent years military planners and Operations Research workers have developed certain analytical techniques based upon cross disciplinary approach. These techniques, though essentially developed for military purposes, are finding way in the field of management and social sciences. One such technique is War Gaming or Simulation. In recent years people have realised the significance of the role of Gaming Techniques in foreign policy planning. These applications of War Gaming in the field of Politics are called Political Gaming or Political simulation.

The social science division of RAND Corporation in 1954 began to develop a conception of Political Gaming which may be characterised as 'Role Playing—Crisis Playing'. RAND's interest in Political Gaming, presumably grew in connection with the analysis of the social, political,

destructive and technological aspects of a thermo-nuclear war. We have no experience as far as the thermo-nuclear war is concerned. Political Gaming was considered as one of the most effective and fruitful ways of analysing the outcome of a thermo-nuclear war. Goldhamer, an employee of RAND Corporation—a non-profit organisation of United States, in 1954 suggested a Political Gaming exercise in which area specialists were selected to participate as representatives of important countries of the world. A team of referees and an individual representing 'NATURE' were also included. The role of nature was to provide for events of the type that happen in the real world but are not in the control of any Government like the death of Late Prime Minister Lal Bahadur Shastri immediately after Tashkent Agreement. The referees had the task of ruling on the feasibility of each move, i.e. they were to disallow any move that was not regarded within the constitutional or physical power of the government proposing it. The referees were responsible for arranging press conference etc.

Certain quantitative methods are devised to enable the participants to take any decision for any action. For some complex problems Electronic Computer is also used.

### OBJECTIVES OF POLITICAL GAMING

The objectives of Political Gaming or Simulation of international relations are:

- (a) To throw additional light on hypothesis about foreign policy and strategy arrived at by more conventional methods of research,
- (b) To pre-test strategies of action,
- (c) To discover un-anticipated contingencies, alternatives or possible outcomes as a consequence of the interaction between conflicting strategies,
- (d) To examine closely one particular line of policy action that illustrates vividly what a single outcome might resemble in detail.

Some of the important problems of international politics which have been subjected to the simulation technique are given below:

- (a) Political consequences of the spread of Nuclear Weapons studied at North Western University in the year 1963
- (b) Problems of Disarmament and Deterrence studied at Massachusetts Institute of Technology in 1962-64.
- (c) A team from North Western University has used an inter-nation Simulation Model employing both personality factors and environmental factors to replicate the outbreak of World War I.
- (d) Joint Chiefs of Staff Joint War Gaming Agency USA is using a computer simulation developed by the Rathen Corporation in the hope of being able to find limits on the range of contin-



gencies which must be considered in future international political military planning.

- (e) Raser and Crow have conducted an inter-nation simulation programme in order to test the effect of one nation's having an invulnerable retaliatory system. Their results showed that when one nation in a cold war system was invulnerable it was seen as stronger, was more threatening, lost some of its interests in Arms control, was able to deter more effectively changed its policies so that accidental and pre-emptive war became less likely but, was much more willing to start wars to gain its national objectives. Other nation's interest in Arms control agreements increased, and alliance pattern shifted towards less cohesiveness.

### TECHNIQUE OF POLITICAL GAMING

Small experimental groups can be used as a model for the study of politics. The technique is essentially role-playing which allows members of a group to use interaction process analysis to consider the issues involved in common problems. Many points are clarified. Clarification is due to the explicit demonstration and analysis of the facts and values which govern the behaviour of people in interaction.

In its simplest form, a role-playing situation is set up by choosing a common problem and placing oneself as a participant in the problem situation. The on-going social/political situation can be simplified in the case of small group experiments. Experimental psychologists and sociologists have developed face to face groups in laboratories. The participants respond to their environment as human beings. These groups are given a problem of mutual interest. They interact with each other as if they have put on the shoes of the objects of study. This role-playing face-to-face interaction is based on certain quantitative measure provided by mathematical models.

The decision mechanism is rationalised by establishing goals of the participants. If representatives represent countries, goals include objectives such as security, domination, cooperation and internal growth.

Environment should be such as to enable them to face the same demands on their time, energy, decision-making capability and understanding of the situation as do the objects of study. Organisation and communication channels are set up as found in the objects of study. Controlled observation repeated trials and systematic manipulation variables pertaining to resources, capabilities, goals are carried out.

Once the simulation is set in motion, the participants take a sequence of decisions as the situations arise and events occur. This sequential process moves forward under a momentum of its own, often in logical and plausible direction not always foreseen. A kind of chain reaction takes

place beyond the capacity of a single mind to anticipate. Thus simulation of international relations can be taken as:—

“Simulation or Political Gaming is a sequential decision-making exercise structured around a model of a international operation in which participants assume the role of decision-makers of international affairs of the participant country.”

### CLASSIFICATION

Various types of political gaming exercises can be distinguished as under :

- (a) Those in which both the assessments of situations and the decisions are made in accordance with completely explicit rules;
- (b) Those in which the assessments are made freely by human beings but the decisions are made in accordance with the rigid rules;
- (c) Those in which assessments are made in accordance with explicit rules, but the decisions are made freely by human beings;
- (d) Those in which both the assessments and the decisions are made by human beings.

### ADVANTAGES AND DISADVANTAGES

The Political Gaming exercise is of immense educational value. Based on the experiences of various participants, Alger has enumerated the following advantages from the educational point of view:—

- (a) It provides vividness and understanding beyond what one gets from a text-book.
- (b) It gives the participants a realization of the complexities and for the lack of simple solutions to international problems.
- (c) Indicates the importance of having reliable knowledge and the importance of communication in international affairs.
- (d) Experience in decision-making enables one to understand better the problems of the decision-maker;
- (e) Develops better understanding of the problem, and goals of nations other than own state.
- (f) Demonstrates the difficulties of balancing the requirements of internal and external affairs.
- (g) Permits cause and effect to be felt. The individual can apprise the effect of his action immediately.

In general political gaming exercises played seriously have led to the evaluation of new policies and new ideas. These have been found valuable in conveying the meaning and implications of proposed policy changes. It aids in judging what information is really important in making decisions and obtaining control. In political gaming exercise we have control

over time. Time-compression can be made and the results of a given policy for a fifteen-year period can be seen in just a few minutes running time. Lastly, it is the cheapest way to have a look before you leap on a proposed policy.

### LIMITATIONS

The following limitations should not be ignored while considering the above advantages of political gaming:—

- (a) It is likely to misrepresent due to lack of empirical grounding of the model as the quantitative data gathered in the area of international relations is very inadequate.
- (b) The realities of international relations are sometimes so complicated that political gaming cannot but oversimplify and under-represent the crucial variables.

### CONCLUSIONS

The technique of political gaming cannot be expected to dictate the decision-makers to achieve national objectives due to its limitations. However, its importance cannot be undermined. The technique is very useful for providing information on the problem involved. Some one has rightly remarked that

*The political military exercise may be rated as excellent for training, useful for teaching and potentially valuable—within limits that have been only tentatively probed for policy research and planning.*

# MILITARY EVALUATION OF TERRAIN A NEW CONCEPT

BY LIEUT-COLONEL B L KAPOOR

## INTRODUCTION

Today's highly mobile warfare requires speedy data on the numerous attributes of terrain for deciding the grouping of forces and successful execution of various tasks in different operations of war. Our present system of collecting terrain data by patrolling, limited air reconnaissance and library research is not only time consuming but also fails to provide specific information required for a particular task or role in a short time. The result is that today we have to base our planning on most general information and this method more often than not yields unsatisfactory results. The greatest drawback in our system today is our inability to predict accurately the potential of an inaccessible area or areas lying across our borders and this adversely affects the conduct and progress of operations as was evident during the brief war during the year 1965. Considering the developments in weapons and equipment, it is vital that a reliable, scientific and speedier method is evolved and introduced into service for determining and feeding the data on the capabilities and limitations of accessible and inaccessible terrain so that correct assessment and proper utilisation of latest weapons and equipment can be made under varying conditions of terrain.

## VARIED REQUIREMENTS

THE different Arms and Services require different type of information on terrain depending on their tasks. Whereas certain information like general ground description, concealment and camouflage potential of an area is common to all for use in different roles, there is a lot of specific information peculiar to different arms and services, e.g. engineers require data on water-supply potential or engineer resources or mechanical properties of soil, Gunners need data on the problem of deployment of guns, crest clearance and the Armoured Corps require data on the off-road mobility potential for different types of AFVS. All this data is required for the same piece of ground by different Arms and Services but no co-ordinated effort has been made in the past to collect, collate and store data in a form that could be used in a hurry by troops at a later date. There is thus a need to evolve a terrain evaluation system which meets the following military requirements:—

- (a) The system should provide specific data on all aspects of terrain to all Arms and Services without resorting to any abstractions so that information is readily available and can be used in planning without delay or confirmation.

- (b) The system should enable Commanders in the field to infer terrain attributes for inaccessible areas with reasonable degree of accuracy.
- (c) The information should be recorded at a tactical scale so that detailed operational planning can be carried out by Commanders and staff in the field.

### PRINCIPLES OF NEW CONCEPT

To be able to store data on wide range of possible uses of terrain and to be able to predict the attributes of inaccessible terrain, it is necessary that a terrain classification technique is evolved. This technique should be comprehensive and should enable us to differentiate different terrains with ease. This is only possible if the classification is based on the fundamental properties of terrain itself and not on one or two or more attributes that determine the suitability of terrain for a specific purpose. Our basis of classification, of necessity, has to be such that it enables us to predict the potential of an inaccessible area. From our common knowledge we can say that conditions at inaccessible sites can be inferred by comparison with analogous accessible sites. Once we can decide on the parameters which constitute an analogous accessible site, then our comparison of two widely separated but similar areas can become easy.

In determining these parameters an elementary knowledge of earth's crust and its composition is essential. In fact, for all terrain specialists and those concerned with the appreciation of ground factor, a knowledge and understanding of Geomorphology is a great help. Earth's crust is composed of diverse landforms which differ from region to region. The differences in landforms depend on the following:—

- (a) The agents which produce them, i.e. whether shaped by wind, water or glaciation action.
- (b) Rock and earth structure of which these are composed of.
- (c) Climate in which these develop.
- (d) Duration of change in the environment.

It can be said that the distinctive nature of a region is the result of a uniform genesis and a region owes its character to the action of a particular climate upon a broadly uniform rock against the background of common tectonic history. In other words, it can be said that irrespective of the geographic location, all regions would have a similar distinctive landscape provided their climate rock type and tectonic history is common. This fact was further supported by Dr. Belcher's observations that regardless of geographic distribution, soils developed from similar parent material under the same conditions of climate and relief are related and will have similar engineering and other attributes which in comparable position will present common construction problems and suggest similar solutions.

## TERRAIN UNITS

This repetitive nature of landscape based on climate rock type and tectonics of the region enables us to adopt this concept as a base for terrain classification. This, however, is the first step in military evaluation of terrain and can be classified as the division of terrain into recurring landscape patterns. To complete the first step, we require complete data on the climatology, geology and tectonics of the region and for this a climatologist/geographer and geologist are essential for proper and accurate evaluation. Once this basic data of a region is available then it can be easily divided into different distinctive areas called landscape patterns.

These patterns are heterogeneous in their attributes and do not provide detailed data specific to their parts of a pattern for tactical planning and it is, therefore, essential to break up patterns into their elements. The patterns are excellent aids to identify and compare regions but have to be broken for providing specific and detailed data. This breaking up of the patterns is the second step in the military evaluation of terrain.

There are two distinctive criteria to be followed in breaking up a pattern into its elements. The first criterion is the ease with which a part of the pattern can be identified particularly in an inaccessible or little known region. This implies that the definition of terrain parts of units should not be based on little known attributes but be based on attributes that can be easily inferred from aerial photographs or general background information. Aerial photographs are vital for the study of attributes of inaccessible area and for this reason, attributes that can be easily seen from aerial photographs should be used in defining terrain units. The second criterion is to find out as to how similar are the different occurrences of the same unit. This is only possible if terrain units are defined sufficiently clearly so that comparison of same units at different locations is easier and more definite. Both the requirements are, however, conflicting. The more finely we define our units by introducing more and more attributes, the smaller becomes the standard error. On the other hand, by introducing more conditions in defining a unit, it becomes more difficult to identify it. Since the overall efficiency of terrain intelligence system depends on both characteristics, a balance between the two criteria of recognisability and reproducibility is essential. Thus, it can be deduced that our terrain units should have uniform physical properties and must be sufficiently easily recognisable with our present knowledge of earth sciences and aerial photographic interpretation. For the time being, we may accept a lower percentage of accuracy in our predictions provided recognition of terrain units in an inaccessible area is easier and facilitates comparison with a similar terrain unit in an accessible area. Of necessity, therefore, our terrain has to be defined on the minimum number of criteria and the definitive characters have to be co-related to features of land use, vegetation, etc. which can be easily recognised.

Considering all these complications, the terrain units can be defined on the following criteria for the time being:—

- (a) Morphology or surface configuration
- (b) Surficial deposits
- (c) Water regime

Once the boundaries of a pattern have been delineated based on steps I mentioned above, it has to be divided into smaller units. Within the pattern the number of these small units will vary depending on the variation in relief, soil texture and composition and the impact of ground water table. It is essential that each small element of a pattern must have the same scope, must be subjected to the same degree of influence by ground water table and must have uniform soil as surficial deposits. Once these conditions are met, it can be said that an element of the pattern has uniform physical properties. Number of such physically uniform elements better called terrain units (facets) make up a pattern. Thus a pattern along with its terrain units forms the hierarchy of terrain classification system. It would be appreciated that terrain units (facets) will NOT have any fixed size as these are defined on the fundamental properties of terrain. In certain places these may be extensive and at other places these may be small. It would be clear from the preceding discussion that in the proposed classification technique, the aim is to divide the regions into patterns and their constituent facets. A facet delineated on the ground by this system will have same climate, rock type, tectonics slope, soil texture and influence of ground water table. Such a unit will have same attributes and will present same problems irrespective of its occurrence.

### TERRAIN MAPS

The concept mentioned above can now be given the practical shape and converted into terrain maps at tactical scale which can be used by the troops in the field and staff at higher headquarters. Our facets as defined above can be transferred on existing topographical maps on scale 1:50,000. A terrain map preparation, however, requires considerable skill and certain number of specialists in earth sciences and aerial photo-interpretation. The basic requirement is the collection of data on climate from meteorological department, lithology (rock type) and tectonics from Geological Survey of India, morphological data from National Atlas Organisation, soils data through State Soil Conservation Department and Indian Agricultural Research Institute and ground water data from Tube-Well or similar organisations. Collection of this data is time consuming but is vital for accurate delineation of facet boundaries. Based on the background information a tentative list of facets is drawn and aerial photographs of the area are annotated and facets marked. Each facet is given a number on

the airphoto and it is ensured that no area of terrain is left uncovered. It is essential for speed, accuracy and ease that aerial photos are made available for terrain studies. In fact, annotation of aerial photos helps in comparing facets in inaccessible areas with accessible areas, adds to the efficiency and accuracy of the system. Once facet annotation of airphotos is complete and confirmed by ground checks, these boundaries are transferred to toposheets and this results in a terrain map/facet map. The salient features of this map are:—

- (a) The map gives the total number of facets which occur on the toposheet and their inter boundaries as superimposed on toposheets.
- (b) It gives the exact serial number of each facet which is superimposed. Thus every map reader can easily see the total number and exact serial number of facets that cover the entire area of the toposheet. It also shows the serial number of facets which are met at number of places on the same toposheet. This makes it easy to compare areas which have similar characteristics and attributes at a glance. Two non-contiguous areas can thus be compared with ease and this enables us to formulate plans for larger areas in shorter time. By using such a map, the reconnaissance plan for any task can be formulated with ease as the exact areas or routes to be traversed can be decided with certainty and ease.

### TERRAIN ATTRIBUTES

Once the facets in the pattern have been finalised and facet maps prepared, we know the number of terrain units that are met in a particular area. It is now most important to find out as to what each terrain unit is good for and what limitations it imposes on the deployment of various arms and services. After this basic data is collected, it is necessary to store data periodically. This means that our terrain classification system must lend itself to the evolution of a terrain intelligence storage system. If we adopt this concept and store data on facet basis, then the following objectives can be achieved :—

- (a) Data for each facet can be stored on every aspect of terrain. This will not only save us from collecting the data for each geographical location but also enable us to compare and use the experience gained at non-contiguous sites for the similar facets with confidence. This will result in economy of effort and resources during planning and execution of tasks.
- (b) Storage on data on facet basis shall enable us to study the attributes of unknown and inaccessible areas with higher degree of accuracy.
- (c) It would become possible to store specific data for each facet which could be used direct without further abstractions. This will save time and provide reliable data to different users.



- (d) The study of military attributes specially trafficability potential of an area composed of a number of facets shall become easy.
- (e) Production of special maps like water-supply or construction material or trafficability maps relating to a toposheet shall become easy.

Considering the above advantages and taking into account the different stages of this technique, the following type of cards shall be needed in the storage system:—

- (a) Pattern Cards
- (b) Facet Cards
- (c) Type of information cards

A pattern card gives the general details of the pattern and is mainly used for recognising and comparing different areas having similar landscape dependent on its climate, rock type and tectonic history. This card, for the purposes and ease of comparison of different regions, gives by a diagram and in narrative form the surface configuration number of facets and their inter-relationship within the pattern broad definitive, distinctive and associated features of the pattern along with air-photo interpretation aids to serve as keys for recognition.

This card is vital for the study and comparison of non-contiguous areas. A facet card includes the same information as is contained in the pattern card though the object of this card is to identify a facet within a pattern using the definitive and associated features details given on the facet card.

The type of information cards give is the attribute of each facet. A separate card should be maintained for each aspect so that a particular user consults a card concerning his own task and does not waste time in scanning through cards having mixed information. A brief description of details that can be stored and made available at a short notice in this system is tabulated below:—

Bottom Land Pattern  
No. 51 Facet No. 349

Sr. No.	Type of Card	Details included	User
1.	Ground Description	(a) General photograph of the Facet in relation to surrounding Facets. (b) General topography giving relief details, depressions, erosions, gullies, out-crops, general vegetation, its density and concealment and camouflage potential.	All

Sr. No.	Type of Card	Details included	User
		(c) Drainage including water logging problems.	
2.	Surficial deposits.	(a) Parent material (b) Colour, texture, structure consistency, permeability salinity, alkalinity, soil depth, drainage, erosion, ground water table fluctuation.	'Engrs'
3.	Soil Mechanical Properties	(a) Mechanical properties and unified soil classification. (b) Atterbergs limits.	'Engrs'
4.	Water-Supply	(a) Data on surface wells-water table, yield, quality. (b) Data on tube-wells. (c) Pumping problems including specifications of tube-well and cost.	'Engrs'
5.	Climate	(a) Temperature (b) Rainfall (c) Humidity (d) Visibility by seasons (e) Wind velocities (f) Clouds (g) Electrical disturbances.	All
6.	Vegetation	(a) Density, species, and uses of grasses, shrubs, bushes and trees met on a Facet. (b) Camouflage capability in different seasons. (c) Timber types and their usefulness for constructional purposes.	
7.	Landuse	(a) Field sizes and nature of field boundaries. (b) Landuse cultivation giving data on availability and palatability of grasses for use by animal transport. (c) Landuse capability grouping for each facet to help grow more food in units.	

Bottom Land Pattern

No. 51 Facet No. 349

Sr. No.	Type of Card	Details included	User
8.	Construction methods	<p>(a) Problems of bridging and rafting on a river, stream or nallah facet.</p> <p>(b) Information on the road, halipad and airfield construction on facet basis. Details on specification and use of equipment are included.</p> <p>(c) Details on building construction.</p>	
9.	Engineer Resources	Details on the quality and quantity of sand, gravel, stone, boulders available.	
10.	Military attributes		
	(a) Armour	—Trafficability potential of each facet for each season and type of vehicle is recorded as passable or impassable. This has to be based on soil strength, relief stickiness and slipperiness of soil, type, size, shape and natural obstacles and vegetation by comparing it with the vehicle capability in respect of each of the Terrain attributes.	
	(b) Artillery	<p>— (i) Data on visibility and observation provided by a Facet and its suitability for an observation post.</p> <p>(ii) Survey problems</p> <p>(iii) Effect of shell/bomb and use of VT fuze.</p> <p>(iv) Employment of Radar locating devices.</p> <p>(v) Construction time for gun pits.</p> <p>(vi) Problems of deployment of guns.</p> <p>(vii) Off-road mobility of guns.</p>	
	(c) Engineers	<p>(i) Problems of mine-laying and breaching.</p> <p>(ii) Field defences, rate of excavation and suitability of local materials for rivetments.</p> <p>(iii) Ease of creating artificial obstacles other than minefields.</p>	

## TERRAIN DATA UTILISATION

The success of any terrain intelligence system depends on the efficiency and speed with which it can provide specific data to different users in the field. Let us now examine if the proposed system can meet this requirement and is an improvement on any of the existing systems in the world. For the purposes of discussion, assume that a brigade group having a squadron of medium armour, a field regiment and a field company of engineers on its orbit is asked to advance from point A to B a distance of 50 kilometers during a week when monsoon has been heavy and most of the areas are susceptible to water logging. The problem for the brigade staff is to select a route from A to reach B without getting bogged *en route*. It is obvious from the prevailing conditions that neither mere eye for the ground is going to help in selecting the best route nor intensive patrolling for the entire areas would be possible in the short time available. If, on the other hand, a team of terrain specialists working on the system discussed in this paper, produces a facet map and the allied type of information cards to the brigade staff, the problem of selecting the route will be an easy, simple and speedy affair. From point A to point B, the entire area is covered by different number of facets. For each facet, specific and complete data has been recorded on the respective information cards. Brigade staff, squadron commander, field regiment and field company commander examine ground description, trafficability, artillery and engineers card for each facet and determine the facets which present no problems or least problems for going from point A to B. Points A to B are connected through such facets and a number of alternative approach lines are drawn on the facet map, thereby reducing the scope of the study to few routes. The best route can then be selected by applying other considerations like degree of enemy resistance distances involved, etc. All that the brigade staff is required to do in such a case is to obtain the terrain (facet) map along with their attributes recorded on specific cards and select the best alternative. This, however, is not possible if terrain specialists have not produced a facet map or determined the attributes of each terrain unit at the time of the commencement of the hostilities. But if the data has been recorded, then the consultation is an easy and speedy matter. This system thus meets the basic requirement laid down for a good terrain intelligence system and provides the most specific data to a user for planning. This system would, however, show that whereas consultation of the facet map and the terrain attributes card is a simple affair, their preparation needs thorough library research, sustained effort by specialists in various earth sciences and continuous feeding of data on military attributes by the field units. To ensure that data on all likely areas of deployment is available, it is imperative that preparation of facet maps and facet attributes cards is done continuously in peace time.

## INACCESSIBLE TERRAIN

Any prediction about the potential of inaccessible terrain is not possible today. With this method, the prediction is comparatively easier though the degree of accuracy of prediction shall depend on the availability of large-scale aerial photographs of inaccessible areas, trained team of air-photo interpreters in soils, geology and forestry and the availability of similar terrain in accessible area. However, when these basic tools are provided, fairly accurate data can be provided in a matter of hours. The main object in evaluating an inaccessible area is to identify the facet or the number of facets which cover the area of study. For doing this, the following procedure can be adopted:

- (a) Find broad environmental details of the inaccessible area.
- (b) Produce a short list of patterns that have been encountered in accessible areas in environments similar to inaccessible area by scanning through the storage system containing pattern cards.
- (c) Locate the exact pattern of the inaccessible area by comparison with aerial photos of the accessible areas.
- (d) Identify the facets within the pattern from the list of likely possibilities recorded on the pattern and facet cards.
- (e) Obtain the capabilities and limitations of facets from the type of information cards held in the storage system and formulate plans.

The degree of accuracy in this system will, however, depend on the availability of trained specialist staff, extensive data matching different environmental conditions.

## PROGRESS AND PROBLEMS OF THIS CONCEPT

The technique suggested in this paper has been evolved after intensive research and has been applied to different environmental conditions with a great degree of success all over the world. America, Britain, Canada and Australia are working the world over, on a similar technique. In our country we have taken up the study in collaboration with Indian Universities, which possess specialists in different earth sciences. I have been personally responsible for conducting these studies for a period of three years and I can say that this system which looked complicated and laborious to evolve, has become simple as a result of great co-operation extended to us by our universities. Today, most of the universities are associated with terrain studies and improvement and refinement work is now in hand. For the success of this system and to improve the accuracy of predictions, certain specific problems, however, have to be considered and solved.

The foremost problem is the need to have earth scientists as an integral part of all organisations concerned with terrain study and terrain intelli-

gence. The basis discussed here makes it clear that an integral approach is essential for military evaluation of Geographic areas, and a team consisting of personnel trained in Geology, Geography, Geomorphology, Soil Science, Forestry, Climatology, Survey, Cartography, aerial photo interpretation and military science is essential. If this system is adopted, which, in my opinion, has no alternative at present, our present terrain intelligence set-up at all levels from Brigade Headquarters upwards has to be changed and has to include earth scientists trained in terrain evaluation technique. The exact grouping of specialists at different levels shall have to be considered in detail but the principle of having specialists in terrain intelligence and evaluation set-up has to be accepted if speed and accuracy in predictions has to be ensured.

The success of this system largely depends on the aerial photo coverage of all these areas over which movements for deployment is contemplated. The quality and scale of photographs is an important consideration as the object in evaluating inaccessible areas is to determine the soils and rock type from aerial photos besides other basic information. This is a vital tool in our hands and, in my opinion, our airphoto interpretation sections at Divisional and upward levels do not make full use of aerial photos as regards evaluation of terrain aspect is concerned. APIs must have trained staff for interpreting soil and rock conditions for determining trafficability potential which it cannot do at present. The terrain evaluation will become much simpler if proper interpretation of airphotos could be ensured at Divisional level. The present facilities available at Airphoto Interpretation School at Dehradun could be made use of and a large number of personnel trained for providing expertise knowledge in interpretation at all levels of Command. The provision of airphoto coverage for extensive areas must also be made for making last minute predictions and building up a complete library of aerial photographs for proper assessment of terrain.

The third main problem is the non-availability of data on the military attributes of facets. Once facet maps are ready, it is necessary to record the military attributes of each facet. At present there is no single agency which collects such a data and stores it centrally, with the result that military evaluation of facet is likely to take a long time. For the future it shall be necessary that all data collected by the units is passed on to the central terrain intelligence and storage agency at different levels for transferring it to respective facet and Military Attributes cards so that this data is readily available when required. If this is not done, then it shall take a long time to build up the storage system complete with all the information. It may be necessary to earmark special units to undertake facetwise military attributes study to speedily complete the task of military evaluation of different geographic areas.

## CONCLUSION

The new concept of terrain evaluation is based on the intrinsic properties of terrain itself and its elements. The concept lays down that each terrain irrespective of its occurrence can be divided into broad distinctive landscape patterns based on its climate, rock type and tectonic history. This pattern can be broken down into its elements or terrain units called Facets which are defined on the criteria of surface configuration, surficial deposits and water regime. Once a region is divided into Facets based on these considerations, a terrain (Facet) map showing different terrain types can be produced by superimposing facets on the topographical maps. This 'Facet' forms the basis for the storage of terrain data and specific information can be recorded on separate cards to meet user's different and specific requirements. The data recorded on facet basis can be used with ease to produce specific maps like trafficability, water-supply, etc., for immediate use by troops in the field. Prediction about inaccessible areas can also be made with reasonable degree of accuracy on Facet basis.

This system has been extensively tried out by us and certain countries abroad. It is no longer theoretical and a large number of studies completed on this basis have clearly shown that the system holds great promise and can completely change the terrain intelligence storage and evaluation system for accessible and inaccessible areas provided terrain evaluation terms consisting of specialists in earth sciences and aerial photo interpretations are introduced at each level of Command. It is equally important that extensive and large-scale aerial photographs coverage is made available to the terrain intelligence set-up as proper comparison by aerial photographs for both accessible and inaccessible areas is vital for accurate prediction. This system is being improved upon with a view to achieving a higher degree of accuracy in making predictions about inaccessible areas and to provide data speedily. It has the built-in potential to meet every user's requirement provided all Commanders and units at different levels of command supply and feed the basic military data collected by them during exercises to a well-integrated and properly composed central terrain intelligence organisation which has to be created for military evaluation of accessible and inaccessible terrain.

# PLANNING OF DEFENCE IN THE MOUNTAINS

BY BRIGADIER H S BAINS, VrC

**I**T appears to be an unfortunate legacy of the British rule in this country that the evolution of suitable doctrine both at the strategic as well as the tactical level has not been given adequate attention by our military planners. There is a tendency to go too much by what has been laid down by the military academies of the West, notwithstanding the fact that our own particular requirements of defence and national characteristics were never taken into account in their analysis and evolutionary process.

A nation's defence planning must suit its own needs. What is good for others may be good for us but before an idea is adopted, it must be subjected to free and uninhibited reasoning to establish its validity. Originality of thought at all levels should be encouraged, so that the techniques that we employ during battle suit our own national genius and yield optimum dividends.

Military planning like all other plans must be based on two key factors. These are the national objectives or 'what we want to achieve' and national resources or 'The means available for what we want'. In fact the process of policy-making involves a reconciliation of these often conflicting considerations. In the case of the enemy on our Northern border our national aim is undoubtedly to safeguard the integrity of our country but we must not confuse that 'end' with the 'means' to achieve that 'end'.

In the final analysis, our strategic goal is the destruction of that part of the enemy's fighting capability which can threaten our sovereignty. From this it follows that it is not the holding of territory or the blocking of enemy's avenues of approach which should dictate our military posture. On the contrary our strategy and tactics should be reoriented to achieve the destruction of any force of aggression that is likely to ingress into our territory.

Coming to the question of resources, the enemy may have an edge over us in military 'hardware' but in the defence of our own soil, the factor of high morale assumes far greater importance. This country has produced bodies of men and their leaders who have overcome the handicaps of inferior relative strengths as well as adverse weather and terrain conditions and surmounted all difficulties. Examples of the armies of Maharana Pratap, Shivaji and General Zorawar Singh will convince any disbeliever that with proper motivation we possess the capability



to defend our hard-won freedom against any potential menace from abroad.

Mobility and fire-power will always remain the key factors in any operation of war but the manner in which these can be achieved should be examined a little more deeply before we adopt the cut and dried methods given in our training precis. As an illustration in the planning of defence within our borders, one factor in our favour is the intimate knowledge of the ground where we can develop our defences. Generally this lack of knowledge on the part of the enemy, along with effective security measures to deny such information about our defensive layout can tip the balance of both the mobility and fire-power in our favour and be the battle-winning factors when the operations commence. The knowledge of the ground cannot, however, be taken for granted. It can only be acquired if commanders at all levels are prepared to walk the entire ground where they intend to fight and manoeuvre. The peculiarities of terrain, weather conditions and enemy threat on our Northern borders pose a number of specific problems of defence which are sought to be analysed in this paper.

### **Mobility in Defence**

The concept of mobile defence as opposed to the conventional area defence has gained much favour recently. Mobile defence is advantageous to the defender under a set of circumstances which are examined below :

#### **(a) Ground and Mobility**

- (i) In the plains of the Punjab and Rajasthan where mechanised movement is possible, mobile defence, without any doubt, will be highly successful. On the other hand, in the hilly terrain, lack of mobility in the conventional sense tends to militate against the adoption of mobile defence. This lack of mobility will particularly hamper fire support, which, therefore, must be made up by close support from the infantry's own animal man packed weapons.
- (ii) The need for effective and full-scale air support both for logistics and for offensive becomes inescapable in the mountains. In fact, time has now come when Army should think in terms of its own logistics and perhaps even offensive air support, as is being done in other advanced nations of the world. In spite of all the gallant efforts of our air force, our ground forces have never been able to get all the air support that they had demanded in the past operations; so, why not give the idea a trial? Army's own air corps can always revert back to the air force if the concept is found to be infeasible. Other considerations of maintenance and training difficulties also need not be allowed to interfere if goodwill exists on all sides. This way a lot can be done in improving the mobility of the ground forces operating in the hilly terrain.

(iii) Coming to the mobility on the ground, at strategic level; construction of lateral roads and tracks should be borne in mind in planning for the defence of the threatened areas. On the tactical level, considerations of lighter equipment, improvisation, developing of local resources to provide sustenance to both man and the beast in the service of the nation and physical fitness for all concerned can go a long way in enhancing the mobility so as to allow the adoption of mobile defences in these areas. We now know how much was achieved by lightly equipped and highly mobile Chinese columns in these areas. Our training standards should lay down comparable targets in terms of time and space, so that we can build up in any threatened sector with the same speed. Methods of carriage of man/animal pack loads also needs to be examined. In spite of all the harness and specially designed carriers, how often one sees during exercises that troops prefer to carry the loads on their heads. Yet, we have never accorded official recognition to this method, although it is a standard practice in the rural areas where the majority of our men come from.

**(b) Air Interference**

Enemy air superiority normally will tend to render mobile defence infeasible but in the hilly terrain where plenty of cover and concealment is available, movement on foot can seldom be detected from the air. This places a premium on dismounted manoeuvres and limiting the use of road axis to hours of darkness and poor visibility. These restrictions should be imposed in all our training moves so that realism is achieved. Additionally, in selecting an approach for a counter-attacking force, its vulnerability to air attacks should be duly considered.

**(c) Enemy Peculiarities**

(i) Enemy doctrine for offensive operations relies mainly on isolating our defensive sectors by outflanking moves and infiltration. Any defence complex which relies primarily on an uninterrupted L of C and which commits itself prematurely to fight the battle from predetermined fixed positions is therefore doomed right from the inception. Defence plans must therefore be flexible enough to contain any infiltrating force of the enemy and a striking force with adequate mobility must be able to trap such enemy in suitable killing grounds and destroy it by a process of attrition. A careful selection of killing grounds along with appropriate layout of the defensive sectors which will canalize the enemy's attacks into such killing grounds should be the primary consideration in planning.

(ii) Another enemy peculiarity which must be exploited is his dependence on captured supplies. Whereas each defensive locality must be self-contained for the number of days that its L of C is liable to be disrupted, we must not make a present of valuable supplies to the enemy. The quantum of stocking and concealment of supply dumps require imaginative judgment in defensive layouts. As a corollary to this establishment of a few scattered supply and ammunition dumps in pre-selected localities hidden

deep in the jungle can facilitate the moves of counter-attacking force and long distance patrols.

- (iii) There is a pressing need for reduction of our maintenance requirements. In the matter of rations, our scales are undoubtedly too lavish for regular supply during battle. We must learn to live on austerity scale to simplify our logistics problem. Furthermore a strict control on ammunition expenditure is vital as otherwise we will have a large number of automatic weapons without any ammunition when the enemy finally closes with the defence.

#### **(d) Nuclear Threat**

The enemy's nuclear capability and their willingness to employ nuclear weapons, irrespective of consequences, should not also be lightly dismissed as if these are of academic interest only. Even if our national policy has precluded the employment of nuclear weapons, we must be prepared to defend ourselves against nuclear strikes. This again is a pointer towards the adoption of mobile defence in preference to static defence. We need not present inviting nuclear targets, which are liable to wholesale destruction as a result of the first nuclear strike.

Notwithstanding all that has been said in favour of mobile defence, area defence will have to be undertaken in certain unavoidable circumstances. Even in such a case opportunities do exist for offensive action such as aggressive patrolling and domination of no man's land. Occasions will also present themselves when spoiling attacks can be mounted without upsetting the balance of the main defences.

#### **Selection of Defensive Sectors**

The concept of the level at which the defensive sectors are specified is rather vague. It is not uncommon for the higher headquarters to usurp the functions of the lower command by specifying defended sectors in detail without any valid reasons for doing so. 'Either you trust your subordinate or sack him' is a good maxim in this respect. It is submitted that apart from the laying down of inter-formation boundaries and junction points on the FDLs, the selection of terrain features on which defence is to be based should be left to the local commanders who have intimate knowledge of the ground. Specifying the divisional vital ground and the brigade ground of tactical importance by the corps and the division commanders respectively along with a clear enunciation of their intentions should be adequate guides to the subordinate commanders entrusted with the planning of defence. With widely dispersed defensive sectors, there is hardly any need for specifying even the junction points and inter-formation boundaries are of general interest only. When, however, a divisional defensive sector is organised as an integrated and mutually self-supporting sector inter-brigade boundaries must be realistically laid down. Too often one comes across instances of river lines being chosen as boundaries.

This leads to divided responsibilities, as enemy approach on a river line can be on either or both of the ridges on the sides. For effective coordination the responsibility for guarding of a particular approach must rest with one specified command.

### **Obstacles and Camouflage**

While we are good in assessing the defensive capability of terrain features, our efforts to develop these are somewhat amateurish. With men, material and time available even small defensive localities, say at a company level, can withstand major attacks. Everybody understands that the laying of mines and erection of obstacles must lie in with the fire plan and plans for counter-attack, yet in practice this is sometimes neglected. One often sees wire obstacles dividing defensive localities into a number of compartments in such a way that in the confusion of battle our own troops will start shooting at each other and make it very difficult to eject any enemy party which would have gained a foothold in one of these compartments. This is particularly dangerous in the case of headquarters and administrative areas where elements of other arms and services are not so well trained in close quarter fighting.

The hilly and wooden terrain offers wonderful opportunities for camouflage and concealment, but these can be effectively utilized only in pre-planned and systematic manner. Haphazard cutting of trees and other vegetation and new footpaths clearly seen from the air will disclose the defended localities. Only essential cutting should be allowed for clearing fields of fire and new tracks must conform to the overall track plan in the defended area.

### **Groupings**

While certain amount of regroupings becomes inevitable during the conduct of battle, these create a number of logistic problems and if carried out as a result of reaction to every enemy move will eventually unbalance the whole structure of defence. In mobile defence the counter-attacking force must have elements of all supporting arms and services to make it self-contained. The mobility of this force must be comparable if not better than that of the attacking enemy. The planning for the conduct of defence must cater for loss of certain defensive localities and whatever regroupings will be necessitated as a result of such set-backs should be pre-planned and known to all concerned. This will also give confidence to the defenders that the battle is going according to the higher commanders' plan. In any case breaking up of the entity of units by attaching/detaching companies/platoons and equivalent sub-units must be avoided.

### **Covering Troops**

The conventional deployment of covering troops under a unified command in a continuous line requires to be modified. Likely enemy

approaches are normally so widely separated that any attempt to hold an unbroken frontage will lead to dispersion and defeat in detail. Covering troops elements strong in fire-power and mobility should be sent to hold key features both to the front and the flanks well away from the main defences to delay and disorganise the enemy's advance. Covering force should not withdraw simply because small enemy infiltration parties have worked their way around it. It must force the enemy to deploy and launch deliberate attacks before it breaks contact and takes up successive delaying positions. In the Himalayan terrain ideal opportunities exist for bold action by covering troops. Even a small force can hold up a major enemy advance, inflict heavy casualties forcing the attacker to move off the tracks, and slow down his advance. Once the enemy's main line of approach has been established, it may even be possible to strengthen the covering force on that approach in the successive delaying positions. A part of the covering troops should 'melt' into the forest after it withdraws to ambush enemy's supply and reinforcement columns. Since normal maintenance of such rear parties will not be feasible, a few days reserves of supplies and ammunition should be dumped in carefully concealed locations. Such tactics will go a long way in denying the freedom of movement that the enemy is accustomed to enjoy in the past. It will force him to picquet his axis of advance to protect his vulnerable supply columns. Artillery and air support should be available to the covering troops particularly when they are in danger of being cut off so that they can extricate themselves by fighting their way out of encirclement. Evacuation of casualties by helicopters and air-dropping of supplies and ammunition for the covering troops should also be planned and rehearsed beforehand. Engineer support for laying protective minefields, booby traps and demolitions will also aggravate the enemy's task still further.

### **Counter-attacks**

An idea seems to have gained ground that deliberate counter-attacks below divisional levels are not feasible. This is so because we hold the FDL on such wide frontages and strength that there is hardly any uncommitted fighting unit to launch a counter-attack and it is not prudent to lift any unit during battle which is committed on the ground for counter-attack. Whatever may be the rationale for this concept in conventional defence, it is an inescapable requirement in the mountains that a counter-attacking force is available to every commander who is fighting an independent battle of his own. It will be suicidal for him to depend upon help to materialise from other sectors of the battlefield. This was conclusively demonstrated during the Chinese invasion of 1962.

The planning for counter-attacks should commence side by side with the defence plans and these should be issued to all concerned well in time for them to their own planning, recess and rehearsals. The details included

in counter-attack plans should be identical to those of a normal deliberate attack and should include

- (a) information about enemy which will be based on the probable courses of action on the part of the enemy and his assumed strength and dispositions after penetration into the defensive sector;
- (b) objectives; The objectives in counter-attacks should be chosen with a view to cutting off the enemy's penetrating force and its destruction;
- (c) location of assembly areas, FUPs, SLs and boundaries;
- (d) fire-support from artillery and other units in defence who are in a position to support the counter-attack;
- (e) timing.

### **Battlefield Surveillance**

Since defence in the mountains is likely to have many gaps between defended localities, early warning of enemy penetration, between these locations is vital. Deployment of screen, OPs, listening posts and patrols should be coordinated carefully in each defence sector. The patrols should be in sufficient strength to launch spoiling attacks on the enemy and ambush his follow-up elements. Civilian sources of information, particularly by training the locals, should also be tapped.

### **Alternative Positions**

It is paradoxical that whereas we accept flexibility as a principle of war, we fix forward defended localities on the basis of the last man and the last round. Apart from anything else it is bad psychology to condemn a defended locality to a suicidal last ditch stand when it is hopelessly cut off from any assistance. In any imaginative conduct of battle there should be no need for such hopeless eventualities. A defence posture should be resilient enough to lose some ground and extract a heavy price from the enemy to achieve a favourable decision in battle. By all means defence localities must be held at all costs up to a certain stage in battle but thereafter when their value to the whole defence complex becomes minimal, occupation of alternative defended localities in depth or even on the flanks should be planned. This is, however, not to say that all defence localities bypassed by the enemy's initial wave of attacks should be withdrawn. In fact we should exploit any such tendency on the part of the enemy to canalize his attack into our killing ground in depth, and attack his flanks and rear from such bypassed localities. Similarly plans for breaking out of encirclement should be made out and rehearsed. Arrangements for evacuation of casualties, formation to be adopted and routes to be taken during the break-out as well as plans for systematic destruction of equipment left behind should be made. The formation to be adopted could be

approximately the same as in the defended locality being evacuated and sub-units should be able to locate themselves in the dark in their new localities with minimum confusion.

### CONCLUSION

The defence in the mountains offers many unique opportunities to a determined commander and his troops. We know it for certain that the enemy on our Northern borders cannot sustain a very much larger force in the field than what we can pit against him. As such we can force him to fight a battle of attrition by trading space for time and inflict heavy casualties on him in the process. We will finally be able to launch a counter-attack to destroy him in detail. We must get out of the rut of thinking in terms of static, fixed line battles and infuse more aggression and mobility into our battlefield tactics. The doctrine for defence must be based on the key word 'aggressiveness'. Enemy's ruthlessness must be met by matching ruthlessness on our part on the basis of 'no quarter to be given and no quarter to be asked'. And, finally, for motivation the advice given to a hesitant commander on the eve of an epic battle will not be out of place here :

*Therefore arise thou, son of Kunti! Brace  
Thine arm for conflict, nerve thy heart to meet,  
As things alike to thee, pleasure or pain,  
Profit or ruin, victory or defeat,  
So minded, gird thee to the fight, for so  
Thou shalt not sin.*

—LORD KRISHNA  
(From the *Bhagwad Gita*)

# MILITARY SYSTEM IN EPIC PERIOD

BY MAJOR S N GULATI

## INTRODUCTION

Our ancestors are said to be savages with little or no knowledge whatsoever even of the most basic and elementary things of life. But is it really so? Well, time alone will reveal the truth in its true colours. But we know for certain that they were very great valiant fighters, they were patriots who laid down their lives willingly for their motherland, they were expert in the art of war and possessed well-organised and well-balanced fighting forces. What organisation did they have? How were their forces when compared with our present-day modern Indian Army? A host of other similar questions arise in our mind. The answers to these questions are not difficult to seek. The *Ramayana* and the *Mahabharata*, our earliest historical books (popularly known as epics) are full of details which give indisputable evidence that during those periods our ancestors possessed a well-organised army based on concepts of our present-day modern armies. But they did lack the modern sophisticated expert knowledge of science, so-called professional touch and modern weapons and equipment. The Epic period of history has been chosen because it offers varied fare and is the earliest period of which the recorded accounts are available. Now then the question is: "what are the dates of epic period"? This is a very controversial point. Different authorities have placed the dates in different ages and no firm age of the epics has been fixed. However, it varies between 5th century BC and 4th century AD and we shall accept such vast variation. Because these two epics were not written in a day or in a year, both the *Ramayana* and the *Mahabharata* it is believed took several hundred years to reach their present form and consequently various sages, saints, *munis*, bards and others might have added the stories of their own. And then as our interest is limited to the study of military systems, the age is of but little consequence.

Military system in the epic period will be discussed under the following headings:

- (a) Defence Services in General
- (b) Army
- (c) Administrative Service
- (d) Military Formations
- (e) Weapons
- (f) Recruitment and Salary
- (g) Training
- (h) Intelligence
- (j) Banners/Dhwaja
- (k) War Music
- (l) Caste System
- (m) Epic Military Code



## DEFENCE SERVICES IN GENERAL

DEFENCE Services unlike the present-day Indian Defence Services were only organised into army and its services.

There is no conclusive proof that air force as an organised service did exist and functioned, though there are legends galore to suggest that the heroes, *rishis* and *munies* flew from one place to another, and even often visited moon in their air vehicles. *Hanuman* was said to have brought *Sanjivani* from the Himalayas within a matter of 12 hours when Lakshmana lay wounded in Lanka. He appears to have flown and certainly he must, otherwise he could not have covered to and fro air distance of approximately 3000 miles in 12 hours. Further *rishis*, it is said, had travelled all the seven *Lokas* which include the sky and the moon. If this is accepted then they certainly possessed not only aircraft but also rockets and spaceships which could take them to moon.

Also in *Bana Parva* it is stated in connection with Salva's invasion of Dwarka that "he (Salva) came there in *Saubhapura* (Flying fortress) which carried the whole army. The wicked Salva mounted his car of precious metal and leaving Dwarka skudded through the skies."<sup>1</sup>

These are but few instances and many more can be found but as yet it has not been established beyond doubt that during the epic period air force did exist as an organised wing of defence services.

Similarly it cannot be said for certain that a well-organised navy did form part of defence services although references to sea voyages occur in both the epics. It is said that Sugriva sent monkeys to Yavna (Java or Javadvipa), Suvarna (Sumatra) and Rajata Island in search of Sita. In *Mahabharata* we hear of Sachdev's journey by sea; his wars with Melachas and occupation of some islands. But, however, in the absence of more convincing proof it is difficult to believe the existence of navy too.

For aforementioned limitations (lack of sufficient evidence) and being mostly concerned with army only the details of military system concerning army will be dealt hereunder.

## ARMY

The Army was organised into four distinct arms :—

- (a) *Patti* or foot soldier
- (b) *Rathi* or war charioteer
- (c) Elephants
- (d) Horse Cavalry

The fourfold division of army is mentioned in both the epics but is more vividly described in *Mahabharata*. However, eightfold division of

army is also mentioned as for example "chariots", elephants, horses, infantry, burden carriers, ships, spies with local guides, the eight, these are the open limbs of fighting forces. 'O' descendent of Kuru.<sup>2</sup> But the latter four being, strictly speaking, not arms to speak of; this study will be confined to only the first four.

### **Patti**

The infantry of epic periods was completely different from the present-day infantry. It had no rifles, no machine guns, no hand-grenades to fight with. It had no vehicles to move about, it had none of the present-day modern emergency or composite pack rations, it had no transistors to amuse its soldier and so on. In short it had nothing. Yet they fought more valiantly and bravely than we did in 1962 against the Chinese. How and with what? The *Patti* of the epic period fought with his hand, his bow and his lance. He had no administrative tail to support him. He carried whatever he needed and what little he could not carry was purchased or procured as is done by the present-day guerrilla. The *Patti*, thus lived off the land. For vehicles he substituted his legs mostly. Days and months were spent in walking to the battlefield and at the end of which he fought a battle. Thus he was far more mobile, fit and strong than the present-day so-called Commando troops. The infantry soldier cooked his own rations—no cook and no NCE's, he washed his own clothes, he cleaned, inspected, repaired and maintained his own weapon. In short, the infantry in the epic period was self-supporting, self-contained, self-sufficient and self-reliant.

### **Rathi**

The *Rathi* or war chariot—corresponds to the present-day cavalry. Each *rath* carried the following:—

- (a) Charioteer
- (b) Warrior
- (c) Helper

But it is also said that there were only two persons on each chariot as is depicted by the legend concerning Karna. Be that so. But it is beyond doubt that *rathi* of the epic age played the most conspicuous and decisive part in all battles during the epic period. "The knight in his chariot is equal to an army. Frequently we find thousands running for one mounted hero. In the case of national hero no bounds are set in description".<sup>3</sup> This shows that *rathi* enjoyed unchallenged supremacy in the military organisation very much like the tanks during the period preceding the invention of anti-tank gun. The *rathi* had no gun but had a warrior mounted who was more than a terror with his personal weapon. Speaking of Arjuna in a chariot Hopkins states that "through fear of Arjuna everybody even the knights ran away. The horse-riders abandoned their

horses, elephant riders their elephants—falling from war cars, elephants and horses”<sup>4</sup>. Such was the might of the *Rathi*.

### Elephants

These were relatively less heard of and played no decisive part in the conduct of battles. However, their importance increased during 600 to 400 BC. Each elephant had a rider and a fighter. The main aim of elephant corps was to terrorize the enemy.

### Horse Cavalry

It was in a very early stage of development and very little is mentioned about it in either the *Mahabharata* or the *Ramayana*.

## ADMINISTRATIVE SERVICES

The two main services as mentioned in *Mahabharata* were—

- (a) Burden carriers
- (b) Spies

However, there were other services too, for the *Mahabharata* speaks of physicians, surgeons and nurses tending the wounded heroes. Also “Besides fighting men both camps (Kaurava and Pandavas) included a large and motley host of non-combatants such as bards, panegyrists, priests, vendors, traders, prostitutes and women of rank”<sup>5</sup>. Thus it transpires that even in those days armies possessed practically all the essential services of modern armies but with a different name. A comparison in brief will make matters more clear.

### Modern Services

### Equivalent in epic periods

Army Service Corps	Traders, burden-carriers and vendors. Traders and vendors supplied the daily needs of the army while burden-carriers carried other stuff needed by the army. But mostly army lived off the land.
Army Ordnance Corps	Clothing and other necessities were few and a soldier mostly carried his belongings. However, other necessities were easily supplied by traders and vendors. Some were locally obtained.
Army Medical Corps	Doctors, surgeons and nurses performed all the duties performed by present-day Army Medical Corps.
Electrical and Mechanical Engineers	Though no equivalent service has been mentioned in the epics yet it is said that all the broken weapons were repaired post-haste. Who did it? The soldier himself or the traders/vendors?

This cannot be said for definite. But we can safely infer that some system did exist for speedy repair of weapons and equipment.

#### Veterinary & Farms

Though there were plenty of horses and war elephants employed during the epic periods yet there existed no service to look after and supply their needs. It appears that fodder was locally procured and the charioteer/rider looked after the elephant or the horses. Doctors mentioned above may have had knowledge of present-day veterinary doctors.

Thus it appears that almost all essential services were catered for but were not highly organised as at present. A point to note is that not only these services were organised but every aspect of soldiers' welfare was looked after. Otherwise the presence of prostitutes and panygyrists cannot be explained. This shows the epic army was at least one step ahead of the present-day Indian Army; though such a step (presence of prostitute) is not considered acceptable as yet.

#### MILITARY FORMATIONS

Based on the available epic literature nothing precise can be deduced. However, *Adi Parva* gives the following units of the army with their constituents :—

6-Unit	Chariot	Elephant	Horse	Foot	Probable present equivalent
<i>Patti</i>	1	1	3	5	Section
<i>Snāmukha</i>	3	3	9	15	Platoon
<i>Gulma</i>	9	9	27	45	Coy
<i>Gana</i>	27	27	81	135	
<i>Vāhini</i>	81	81	243	405	Battalion
<i>Prtana</i>	243	243	729	1215	Brigade
<i>Samu</i>	729	729	2187	3645	Division
<i>Anikini</i>	2187	2187	6561	10935	Corps
<i>Aksauhini</i>	21870	21870	65610	109350	Army

Thus it appears that an army consisted of roughly 9 divisions and a uniform triple system of increase in each army was the rule for the formation of each unit.

Even here the various versions given differ; for *Udyog Parva* states that "a *sena* consists of five hundred war cars and the same number of war elephants and ten of these constitute a *prtana* and ten of the *vahini*". However, the one given above is universally accepted and is further

'reinforced by the fact mentioned in *Udyog Parva* Sec XVIII that eighteen *Akshnis* took the field during Kurukshetra War— 11 on behalf of the Kauravas and 7 on behalf of the Pandavas. Thus it appears that the epic army in India was a very formidable force for any outsiders. The following table will show the comparative strength :—

	<i>Chariots</i>	<i>Elephants</i>	<i>Horses</i>	<i>Foot soldiers</i>
Pandavas	153090	153090	459270	765450
Kauravas	240570	240570	721710	1202850
	<hr/> 393660	<hr/> 393660	<hr/> 1180980	<hr/> 1987300

Taking into consideration that each chariot and elephant had only two riders each then the total strength of armies pitched against each other in the epic period comes to 4,733,920, i.e. approximately 5 million. Thus a field army of such a tremendous magnitude is in itself a proof of organisational ability which in itself shows how well developed was the military system and the armies during the epic periods.

### Weapons

Legends have us believe that during the epic period there existed missiles, anti-missiles and weapons capable of destroying the world. Only the nomenclature differs. *Agnivana* (missile that sets fire) *Varsha Vana* (missile that brings rain) and others were missiles. Then again both the *Ramayana* and the *Mahabharata* speak of weapons being hurled in the sky to destroy the weapons of adversary. So it appears (if we believe there is some truth in these legends) that the weapons and weapon system were very much advanced. But since no conclusive proof has been found, these weapons continue to be considered as flights of fancy. However, it has been established beyond a doubt that there were two types of weapons—

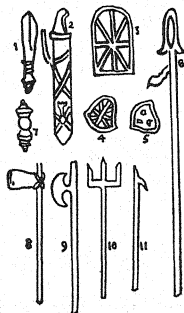
- (a) Offensive
- (b) Defensive

The number of such weapons used is simply stupendous. Each warrior or tribe had some variation or difference in their weapons. However, the main arms as per Dr. Chakrabarty<sup>8</sup> were as under:—

### Offensive

- (a) *DHANU* — Bow
- (b) *ISUX* — Arrow
- (c) *PRAHANA* — Weapon
- (d) *SAKTI* — Spear (made of iron also called *kunta* spear)
- (e) *GADA* — Mace

- (f) *YANTRA* — A general term denoting an engine of offence and defence.
- (g) *KULHARA* — Battle-axe wielded by nobility.
- (h) *SATAGHNI* — "A hundred killer" a rocket usually placed at the wall and gates of forts and fortified towns.



### Defensive weapons

- (a) *A VARANA CARMA* — Shields
- (b) *A VARMAN KABACA* — Body Armour
- (c) *SIRASTRA* — Helmet
- (d) *KATHA TRANA* — Neck protector
- (e) *HASTA PAVA* — Shooting glove.

In the armoury of defensive weapons forts occupied the pride of place. These forts were so constructed that they offered natural defensive potential and were extremely difficult to capture. From *Mahabharata* we get a graphic and detailed description of the fort Magadha, the capital of Jarasindha "Behold 'O' Partha (Krishna) the great capital of Magadha standing in all its beauty. The five large hills of Vaiheras, Vareh, Vrishva, Srigiri and the delightful Chaityaka all the high peaks overgrown with tall trees of cool shade; connected with one another seems to jointly protect the city of Giri Varaja"<sup>9</sup> In another description about the city of Dvaravati; "the city at that time was well furnished on all sides according to the science (of fortification); with penons, and arches, and combatants, and wells and turrets and engines and miners and streets barricaded with spiked wood work and towers and edifices on gateways well filled with provisions and all the bridges over rivers were destroyed and boats forbidden to ply and the trenches (around the city) were spiked with poles at the bottom. And the land around the city was rendered uneven and holes and pits were dug therein, combustibles were secreted below the surface."<sup>10</sup>

Thus it transpires that during defence operations, besides the defensive weapons, obstacles, demolitions and trench works were extensively used and skilfully combined with natural and artificial obstacles very much like the present times.

### DHWAJA OR BANNERS

Like our President colours the epic army had its own multitude of banners to embolden and spur the soldier to attain greater glory. These

banners were attached to the pole on the chariot of the hero, eg. Arjuna's dhwaja in *Mahabharata*. These banners also acted as rallying point of the forces. Each hero/Raja/Maharaja had his own banner. The banner was the symbol of the honour of the army and if destroyed or temporarily lowered it symbolised the defeat of the army.

### War Music

In this respect the epic army even scored a point over present-day Indian army. It had various instruments of war music to rouse the spirit of warriors, to invoke the blessings of God and to strike terror in the hearts of enemy as is evident from a description in the *Bhagavad Gita*.

*Arousing in him the joy the Kaurava elder the grandsire majestic, blew his conch ringing a high blast of lion roar. Thereupon Madhus lord and Pandus son standing in a great car yoked with white steeds blew each his glorious conch.*<sup>11</sup>

Besides the conch the *Mahabharata* mentions *Mardanga*, *Panava* and *Anaka* as some of the musical instruments used in times of war.

### Caste System

There exists a misconception in many minds that during the epic periods only Kshatriya's fought and Brahmins, Vaishya and Sudras were not allowed to become soldiers. There could be no greater lie than this. For in both the *Mahabharata* and the *Ramayana* there exists plenty of evidence to show that Brahmins fought shoulder to shoulder with Kshatriyas. Arjuna's guru was a Brahmin, the Haka story refers to the training of Brahmin lad in archery. Again priests, vendors, traders and prostitutes accompanied the army. Thus army consisted of Brahmins, Kshatriyas, Vaishyas and Sudras and it is safe to conclude that during an emergency they were all forced to fight against a common adversary in utter disregard of caste or creed.

### Recruitment and Salary

The next most important question which arises is as to how such huge armies were raised? Was there conscription (like in many western countries) or were the soldiers hired like mercenaries of Congo or were they recruited openly and men joined armed forces willingly to earn money or fame?

Let us tackle the fundamental question first, i.e. how the army was recruited. No clear cut rules have been mentioned anywhere. Patti, i.e. foot soldiers, were probably recruited from all available sources including foreigners. The only criterion in recruitment being the quality rather than the quantity. There is no mention of mercenaries or conscription anywhere. Probably soldiers did receive fixed and regular sala-

ries as is described by *Sukranti*. "The strength of the army is to be increased by good payments, that of arms and weapons by penances and regular exercises"<sup>12</sup>. Also there is a reference to the grant of special extra allowances in advance to the army personnel and also to the provision for the family of soliders dying on the battlefield.

Thus it is seen that

- (a) Soldiers were freely recruited and not conscripted. Mercenaries were not employed.
- (b) Soldiers were paid regularly fixed wages.
- (c) Extra and special allowances were paid.
- (d) Next of kin of soldiers were well looked after.

### Training

Training was more or less hereditary. No sooner the son grew up then he was initiated into the depths of fathers weapon. Besides there were regular gurus who imparted training on receipt of "Dakshina". Gurus were employed for teaching the sons of nobility. The institution of gurus was a highly respected and organised profession. These gurus had their own schools for training. Each guru was master of his own art/ profession and prided in imparting the education to select pupils. *Adi Parva* mentions of a sort of forest university where young learners received education in military training.

Besides there were numerous contests at skill of arms wherein soldiers and warriors flocked to try their powers and win honours. In the *Mahabharata* there are references to many such military tournaments in which Drona tested the military skill of his pupils. The very institution of marriage (*Swayambara*) also forced the people to become expert in art of war. Thus, they are experts in climbing, riding, quick march, beating, entering and coming (out of fort) and their skill in fighting "the elephants, in horsemanship and charioting has been tested."<sup>13</sup> said *Dhritarashtra* in his speech on the quality of his pupils.

That army was very well trained is shown by speech of Ravana to his Commander-in-Chief: "Here order my four limbed army which is well trained in military arts to defend the city carefully against the enemy."<sup>14</sup>

Thus to summarise:

- (a) Army in epic days was well trained in skill of arms and art of war.
- (b) Training was mostly hereditary or imparted by gurus and at forest universities.
- (c) Progressive improvement in training was achieved by means of military tournaments (and, of course, various feudal wars).



### Intelligence System

No war can be fought without some kind of intelligence being available about the enemy, and as such even in the epic period there was a well-organised system of collecting both strategical and tactical intelligence. The information was mostly obtained by employing diplomatic agents (*Duta*) envoys, ambassadors and spies both in time of war and peace. The *Ramayana* mentions three kinds of envoys. Rama sent Angad (as envoy) to Ravana with a message "Give Sita or fight", Rama also enquires from Bharat whether he was fully informed of the eighteen *thirethes* of foreign countries through spies. He also sent Hanuman as an agent to find out the exact location of Sita and for espionage, spies have been mentioned to have been sent in search of Pandavas while they were in '*Vanvas*'. Thus there was even the system of espionage in epic period.

### Epic Military Code

Unlike the present-day Geneva convention the armies during the epic periods had an excellent military code. This code is even more noble and stricter than the present one. It forbids striking at rear areas civilians, unarmed warriors, enemy with his back to adversary, warriors without any coat of armour, unequalled or fallen foe. It also stressed granting of humane treatment to prisoners of war. Some of the rules as mentioned by Dr. B.K. Majumdar are <sup>15</sup>.

- (a) A warrior in armour should not fight a Katriya without a coat of mail.
- (b) A cavalryman should not attack a car warrior. The principle behind it is that fight should be between equals.
- (c) Poisoned arrows and barbed arrows should not be used. No helpless benumbed or defeated person should be pierced with an arrow.
- (d) Non-combatants who hide themselves in fear or who are mere spectators should not be killed.
- (e) A suppliant enemy after he has laid down his arms should not be killed. Prisoners of war should be treated well. Courtous treatment should be accorded to maidens made prisoners of war till they are sent back home after a year.
- (f) One who has one's hair unlocked, one who has turned one's face against one's opponent, who is in folded palm without arrow, without armour and one whose weapon is broken and a Brahman should not be killed. The list of persons to be spared in battles is also found in *Manu Samhita*—Chap VII SI-91-93.
- (g) The sick and the wounded should be looked after.
- (h) In case of an insufficient supply of numbers in a particular division or divisions of the army substitute may be used. The

Puranic literature forbids clearly seizure or destruction of enemy's property except under grave necessity. Temples and temple treasures, properties of non-combatants and private individuals enjoyed immunity from seizure and destruction in war.

- (j) The *Shastras* do not allow the liberty in warfare of striking below the belt.

## CONCLUSION

It is common knowledge that medieval Indian civilization was much more progressive than any other civilization of those days. They possessed highly organised social, cultural and military system of life. And in fact from the two epics we learn that our ancestors were not only expert in art, music, literature, religion and philosophy but also in the art of war. They ruled various kingdoms and sent emissaries to the foreign countries. They maintained huge, well trained armies. These armies of old were recruited, organised, trained, paid regularly and based more or less on the present-day concepts. These armies were supported by battle-ried administrative system, morale was well looked after so much so that even the deceased soldier's family was cared for. Therefore, it is not surprising to note that the soldier in epic period was much more respected, honoured and sought for and looked after.

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# ESSENTIALS OF AN AMPHIBIOUS OPERATION

BY MAJOR MICHAEL F. PARRINO, USAR (RET.)

**M**ILITARY records reveal that the most decisive amphibious operations of World War II were undertaken by the conventional army infantry divisions of major military powers, such as Great Britain and the United States. Organically, these units were and still are markedly deficient in the major requirements of amphibious warfare. Despite this prodigious handicap, they were even then surprisingly adept in assaulting the beaches, often with no more preparatory training to personnel than that impelled by an existing exigency or fundamental need. Today's increasingly complex manoeuvres, requiring smoothly operative techniques to facilitate troop transport by sea (see appended note), makes it vitally imperative that ground forces on all levels have more than a superficial knowledge of the basic essentials of amphibious operations, thus militating against any tactical shortcoming that could foredoom the assault to chaotic failure.

## Significant factors

A broad general understanding of the respective roles of the armed services involved is an essential requisite for a heightened appreciation of the extraordinary complexities which append to a highly specialized venture such as the amphibious assault. These roles, sharply defining the respective areas of responsibility of the ground forces, navy and air arm, are intimately pertinent to operational control which, in turn, is dependent upon three indispensable factors—flexibility, timeliness and coordination.

Since the success of the joint effort hinges on a proper correlation of these distinctly significant factors, it would not be remiss in this era of lightning military thrusts to review briefly their practical application to this highly specialized type of operation.

## Flexibility

Consider, for example, the conventional army infantry division referred to above. This division typically constituted the landing force element of the amphibious task force. In preparation of the mission, it was directly responsible for (1) the preparation of loading planes, (2) the preparation of troop and supply schedules, (3) the allocation of its various units to ships, (4) the movement to the embarkation area, and (5) the coordination and supervision of the actual loading. The navy furnished the ships and approved all loading schedules. (Reference to the general role of the air arm will be made subsequently).

The division was usually broken down into five embarkation elements—one for the division headquarters, one for each of three infantry regiments and one for the division artillery. Generally, however, the regiment was combined with a satisfactorily proportionate amount of artillery to form a functional combat unit, for example, a typical regimental combat team of the United States army type.

Thus, the division artillery could embark either as an integral element, or as separate units which would be either generally attached to infantry regiments or directly assigned to infantry battalions. These battalions very often were accompanied by sections of regimental headquarters and a tank company, thus forming an embarkation team which was usually berthed in one ship. A battalion embarkation team, most likely, would have also included artillery forward observers. Notwithstanding these variations in composition, each embarkation element would have ordnance and signal personnel; even a military government team. Except where inconsistent with tactical requirements, no hard and fast rule existed, therefore, regarding the allocation of ship spaces, not only in respect to the artillery but to the other units as well. The important consideration was to attain the optimum in flexibility in order to land the troops as expeditiously as possible.

### **Timeliness**

Thus, the more flexible was the loading plan, the less shackled was the factor of timeliness in spurring a united impetus to the landing phase of the assault. Its significance can perhaps be best appreciated in the employment of artillery fire support.

The primary value of the artillery during the landing stage of the amphibious operation unquestionably lies in its capacity to be in quickly effective firing position on beaching, thereby enabling it to provide singularly timely fire support to the infantry which, at this critical juncture, is perilously vulnerable. Although the use of artillery in an amphibious operation is generally guided by applicable principles of land warfare, its passively inert condition up to the moment of actual beaching ordains timeliness to a pre-eminence in the formulation and execution of the tactical plan.

Where timeliness, within the context of conventional fire support, simply implies that the artillery be "in the right place and at the right time", another commanding requirement is called for in the amphibious assault—an incredibly swift acceleration of fire power in a minimum of time. The traditionally recognized capacity of the artillery "to shoot, march and communicate", therefore, must also include the extraordinary ability to shoot "on the run", as it were. If the original plan of space allocation is sufficiently flexible, then, the factor of timeliness at least

in so far as the artillery is concerned is vastly enhanced, thus affording the infantry a fairly calculable chance to exploit the ground action under effectual protection.

### Coordination

But flexibility and timeliness, even in their application to the limited areas noted, are of questionable value to the amphibious operation if there is not a skilfully coordinated effort to impel a harmonious impulse to the tactical plan. Reference is again made to fire support to illustrate the absolute need to cultivate and maintain this dominant factor at needle-point sharpness in order to accomplish the delicate mission of promptly securing a beach head.

Primarily, it is the navy and the air arm which initially provide direct and general fire support during the pre-landing, landing and post-landing phases of the amphibious operation. The transfer of this function to the artillery, however, begins to take place immediately, following its beaching. Only when the artillery is capable of providing adequate covering support to the offensive thrust do the other services assume secondary roles, in so far as fire support is concerned. Of paramount importance during this critically transitional period is the absolute requirement that fire support be rigorously maintained. Needless to state, only a skilfully coordinated effort can assure an orderly shift of functions and continuity of support.

It is evident then that the amphibious operation is an extremely complicated manoeuvre, requiring meticulous training and planning. To properly understand the exacting responsibilities of each of the services, it is vitally imperative, therefore, that ground forces, at every level of command, plan, train and thoroughly understand the requirements, functions capabilities and limitations of each component of the amphibious task force. Thus, can the essential factors of flexibility, timeliness and coordination be more readily appreciated and responsively embraced, thereby helping to culminate the mission to a successful conclusion.

(Note: The most encouraging example is the Mechanized Embarkation Data System (MEDS), using an IBM 1401 Computer, which can convert heretofore unobtainable data into reliable information for the rapid and accurate formulation of embarkation plans in respect to billeting, cargo loading and vehicular equipment.)

# THE LASER

BY MAJOR S. CHOUDHURI

*I have spent my life trying to guess  
what was there at the other side of the hill*

—FIELD MARSHAL WELLINGTON

## INTRODUCTION

This impulse in man led to the designing of the IC engine, smashing of the sound barrier and the harnessing of nuclear and thermo-nuclear energies. Such an impulse followed by reasoning and logical thought process made it possible for Dr. Charles Townes in 1951 to invent the "MASER." This device emits a narrow intense beam of microwaves similar to the Radar or very short-wave radio. The MASER is used for tracking satellites and for long distance communication work. It was this device that gave rise to the idea of LASER beams and made the invention of LASER a reality.

## HISTORY

**T**HROUGHOUT the '50s Townes worked on the supposition that light being akin to radar; the former of course being of a much shorter wave length an instrument could be designed to shoot light just as a MASER shot microwaves. In 1958 he, together with Dr. Arthur Schawlow, published a paper suggesting the idea and outlining its general principles. It became a theoretical possibility. Even before the equipment could be designed the name LASER was adopted in the scientific world. It is an acronym for the phrase "Light amplification by stimulated emission of Radiation."

On July 15, 1960, Dr. Ted Maiman managed to shoot a brilliant beam of light with the help of ruby crystals. This beam was thousands of times more intense than sunlight. Dr. Maiman's first LASER shot a brilliant red spot on a wall of his laboratory but similar instruments have since been developed of such power that their beams could bore holes clear through the same wall. A powerful LASER beam if focussed on a piece of metal can heat a small area of it, almost instantly, to a temperature many hundred times that of the surface of the sun, it can burn holes through diamonds and in fact can vaporise any known substance.

## DEVELOPMENT

A LASER in its simplest form consists of three parts, a crystal cut to about the size and shape of a .99 m.m. cartridge, a photographer's flash gun and a reflector. The crystal normally used is ruby or glass. In place

of crystals, plastics, liquids and gases can also be used. In actual fact LASERS are not complicated at all. PERKIN—ELMER and BEL companies are loaning small ruby crystals priced at about 500 dollars to promising school students who build their own small-scale low-powered LASERS.

The amplified light that is produced by the LASER is unique in its intensity and, therefore, the energy it unleashes. Low-powered gas LASERS of the continuous beam variety produce enough light to blind anyone in under a second, whereas the high-powered pulse variety can burn a hole through the motor-car bonnet in a millionth of a second, or through a tank in about a hundredth of a second. These energies are so colossal that they defy ordinary comparison.

The following example may help to describe, and thus give an idea of, the inherent power of the LASERS. Take the sun in its brilliance at noon. It bombards the surface of the earth with a power approximately equivalent to one-tenth of a watt per square centimetre. LASERS exist that produce light at 500 million watts per square centimetre, i.e. five million times more powerful than the noonday sun. Compare to this the light or flash produced due to a nuclear explosion. The blinding flash would appear to be about 30 times as brilliant as the sun at noon if the nuclear explosion was seen at 10 miles from ground zero. So far the most powerful LASER known is the 500 million watt pulse variety. This is of course common knowledge, instruments producing much higher power output most certainly have been designed and exist in top secret military projects developed by the more advanced nations of the world.

In the five years since 1960 many new types of LASERS have been developed. Some gas LASERS produce and project light in the 7 basic colours and a further combination of these producing additional 63 colours. Of these a type of blue-green is specially useful for under water exploration, it acts as powerful underwater searchlight. In size and power these vary a great deal. Some are low powered delivering continuous beams of light, others build up a tremendously powerful charge of light and then deliver in a violent explosive pulse lasting only a few millionth of a second. Some LASERS are as big as a motor-car yet others as small as pinheads.

## FUNCTION

How does it work? Imagine a substance capable of fluorescence, e.g., a crystal of ruby, when the chromium atoms are excited by a form of energy, such as a flash of light, some of them get 'pumped' into a state of higher energy, eventually they drop back to their normal state. In doing so they radiate energy in their own characteristic wavelength, in the case of ruby it is red light. The object of a LASER is to amplify

this light and control it. Dr. Maiman, therefore, had the two ends of his ruby rod ground optically flat and parallel. Both ends were silvered, one more than the other producing a mirror effect that would let some light through one end.

Now the sequence. When such a ruby crystal is hit by a flash of brilliant white light certain phenomena take place in a few thousands of a second. The atoms are instantly pumped up to their excited state. As the first few start calming down photons shoot off from them in various directions. Some of these go out by the sides of the crystals whereas others strike the mirrored ends square on. The latter begin to bounce back and forth along the length of the ruby rod.

In their path, these energised photons meet and collide with millions of other atoms that have not had time to settle down from their excited states. These in turn being thus stimulated shed their photons, adding to the growing surge. Finally, a large number of these photons shuttling back and forth emerge from the less silvered end as a brilliant red beam of light.

The intensity or the brilliance of such a beam of a LASER depends on the number of atoms available for stimulation. A solid, such as ruby, carries more atoms by volume than a gas, similarly a big ruby has more of them than a small one. All very well, but the size of a ruby is also limited, it being rather difficult to produce a flawless one more than a foot long or half an inch in thickness. The scientists, therefore, thought of getting the same effect from glass. These days LASERS are in existence that use glass two feet long and an inch thick. Glass is doped with rare earth, neodymium, in order to make it fluorescent. In other words, any thing that is translucent and will fluoresce will 'LASE'. LASER beams can be very finely focussed, if carefully done they can be beamed finer than a pin-point. This quality of fine focussing depends directly on the method adopted to generate these beams. The photons that are emitted from the medium are those that strike the mirrored surface square on. They are all then travelling parallel and in the same direction, their paths can be bent under control by a lens placed at required distance from the source. They can thus be focussed to a point at 'F'. For any other light the photons travel in diverse directions. Their paths are almost parallel but never so orderly as in a LASER. The sun as the source comes very near this perfection.

For example, even without special focussing such a beam off a LASER is so parallel that it does not spread more than  $\frac{1}{2}$  inch per mile. The best searchlight beams if aimed at the moon would spread out several times the moon's diameter by the time it reaches its surface. In 1962 a beam of light from a LASER was shot at the moon. It was focussed through a small



telescope. This spot of light when it impinged on the moon's surface was about a mile-and-half wide.

One of the good properties of a LASER beam is its tightness, because of this it can be focussed to so very fine a standard. Apart from this it has other remarkable characteristics. One such is its coherence. The LASER waves are all exactly the same in length, all lined up, crest and troughs matching as if by precision. Such a light has never been seen before. For comparison, the red light from railway signal or from traffic lights in big cities send out a jumble of waves which are received by the eye. Here the light waves are of varied lengths and just because the long waves predominate we see them as red. A LASER beam sending out a red beam can be focussed because of its coherence to a point no larger than the wavelength of the light in question—in the case of red light, to about 30 millionth of an inch. This is remarkable indeed. Next in importance is its intensity and brilliance. This has already been discussed earlier. Some problems met with in regard to military usage are the question of its power supply, long distance aiming and focussing. Nothing very much is known of this; however, it is absolutely sure that the solution has been found and the death ray of FLASH GORDON is not far off. The qualities stated allow LASERS to be used for many purposes, both humanitarian and otherwise.

### USES

Starting with destruction, the progress is cloaked in top secrecy. An experiment was conducted in two parts. In the first a LASER rifle was used to ignite a flash bulb, and in the second a LASER gun finely focussed burned a neat hole through a diamond.

The use is obvious. Troops can be blinded and explosive charges can be detonated from way away. Missiles can be destroyed at a long range and similarly armoured vehicles and defence structures can be damaged or destroyed from a long distance.

These beams are now used for range-finding and tracking. Both are in active use, and in fact a missile travelling a hundred miles away at thousands of miles an hour has been faithfully tracked from the minute it was launched. Its range was measured out and recorded, the error at 137 miles was one yard.

Communication comes in for a large amount of consideration. They can be unjammable; extremely directional, therefore very secure. The carrying capacity is also fantastic. The number of messages that can be packed on to any kind of radiation depends on its frequency, the number of waves that will pass a given point at a given time. An ordinary short-wave radio has frequencies ranging up to a few million waves or cycles per second. LASER light with its microscopic waves has frequencies in the

region of 500,000 million cycles per second. By using suitable filter devices one LASER beam could carry several million simultaneous telephone conversations. There is also a great promise as regards long distance communication, particularly in outer space. The beams do not dissipate, they are noise free and deep penetrating. Space crafts to Mars may be guided by these beams and interplanetary messages flashed on them in an instant.

The use of LASER in medicine is an established fact in America and also in some Continental countries. Retinal detachment resulting in partial or total blindness has been very successfully treated. This is a condition where the light sensitive inner lining of the eye due to some reason, peels away from the firmer part of the eye ball. In the days of yore (about four years ago) this was a tricky job. Now the whole thing is welded the patient fit off the table in less time than it takes to read this paragraph. Total number of such successful eye operations have reached over hundred.

Cancer can be burned away including the dreaded melanoma. Neuro surgery and brain operations of a very minute nature have been performed with success. Even malignant unreachable specific organelles inside a living cell have been treated by irradiation.

Other general uses for which detailed study is in progress encompass almost anything—in the variety of, you name it we have it series. To name a few, as an instrument of biological research, underwater exploration, transmission of high voltage electric power over long distances without physical wire or structures and for welding infinitesimally small electronic parts under a microscope. This would take miniaturisation to the limit.

## CONCLUSION

In conclusion, LASER is an invention that may revolutionise science and industry. The idea born in 1951 has now become a reality. Its intensity, coherence and simplicity of manufacture would enable mankind to use it for the purpose of destruction, industrial production of special parts, welding communication and medicine. It is still in its infancy with unimaginable advantages and power locked up in its characteristics. In the early '60s it was an invention looking for a job, now it is being saddled with many jobs, yet it is only a beginning !!

## BOOK REVIEWS

### ON THE USES OF MILITARY POWER IN THE NUCLEAR AGE

by Klaus Knorr

(Published by Princeton University Press, Princeton; 1966). Pp. 185, Price 40s.

The subject of study of the present book is very important in the context of the present day when on the one hand nuclear power is no more a monopoly of the first few who came in the field and are now known as the Super Powers and on the other while conventional military forces of these great powers are greater than ever before, there is continued talk of disarmament for over a decade and more, coupled with the fact that smaller states and emerging nations which now are independent, are set on the path of expansion of their military power. Thus increases in the nuclear capability of a number of nations, with large resources and budgets spent on them, no diminished expenditure on the conventional armed forces except a very small percentage and that too for influencing world opinion, is the order of the day. There is no slackening of the arms race in spite of the continued dialogue for a beginning in the opposite direction in international conferences.

The possession of a huge atomic arsenal besides unlimited power has no doubt produced a balance of terror and led to a certain extent to the preservation of the international *status quo*. But then the author rightly points out that even this situation leaves enough room for manoeuvre and that the possession of military power for the furtherance of territorial or economic gains does not hold every one in awe. The emergence of a new type of 'sub-limited' war in the post-war era has added another dimension to this problem. The effect of this 'modified' nature of war in the presence of stresses and strains and the changes in the usability of national military forces, on international relations in spite of military alliances are very ably analysed. As one follows the argument there is ever increasing realisation that something must be done to get out of the trap that we have so ingeniously woven around ourselves. Scientific advance and its consequent capabilities seem to know no limit. With this knowledge in the possession of mankind there seems to be a move in the other direction according to which people are unwilling to question and discard established modes of social existence and practices and quite rightly too. This it must be accepted is a good sign and has to be encouraged. Under these circumstances the tendency now seems to be 'to suppress these anxieties, discount the future excessively and hope for the best. The result is a massive inertia'. But then it must be agreed that this is not the answer to the problem. 'The only hope is that prudence instilled by fear, and luck, will last long enough for a new generation to appear that, intolerant of an appalling man-made dilemma and irrelevant of their fathers' immobilities, will master the monster of unbridled technology; sums up the author. This book should go a long way in contributing to an understanding of this complex problem.

## THE THEORY AND PRACTICE OF WAR

by Michael Haward

(Published by Cassell, London). Pp. 377, Price 50s.

This is a collection of essays presented to Captain B.H. Liddell Hart—the Captain who teaches Generals—on his seventieth birthday. The authors are among some of the world's leading military writers—pupils, disciples, admirers and friends of Liddell Hart. They have, in all fairness, acknowledged and emphasized his influence on military thought during the last fifty years. The attempt was not to be any definitive assessment of the contribution which Liddell Hart has made to military history and theory, claims the editor, or to the events of his own time, for as a thinker he is still so active and as a writer so prolific for any such attempt to be incomplete and premature.

Part one of the book deals with the development of strategic and tactical theory in the west from its origin in the eighteenth century (1740) to the present day—the tremendous influence exercised by Jomini and Clausewitz on the military thought and doctrine. This is followed by the impact of JFCG Fuller and Liddell Hart on French, British and most of all on German theory and approach to the problems of war. Beginning with 1917 when still very young (22 years only) Liddell Hart evolved the Battle Drill system which was subsequently adopted in the British army. Since then, even though invalided out of the army after active service on the western front, Liddell Hart has been actively engaged in interpreting and evolving a revolutionary concept towards the business of war—air power, armoured forces and amphibious strategy. The essays in the concluding portion cover subjects like problems of Soviet and American strategic doctrine and Alliance Policy. The last two essays on the training and doctrine in the British army since 1945 and the one on the making of Israel's army are very interesting and indicate the great changes that are afoot in the basic military organisation.

This book should form an excellent handbook for all who want to study the latest trends and development of the art of war for it is not all bullets and bayonets but involves deep thinking in the formulation of doctrines and national policies which lead to the beginning of a war or to the peace following it.

G.S.

## THE BATTLE FOR NORMANDY

by Eversley Belfield & Essame

(Published by B. T. Batsford, London; 1965).

This is a volume on a decisive phase of the struggle for Europe, when massive sea-borne and air-borne assaults were made by the Allied forces in the June of 1944 on the beaches of Normandy to secure bridge-heads from which further attacks were launched to dislodge the Germans from their fortified and strongly defended positions in northern France. The events of the D-Day when landings were made are not given, but the account begins from D+1 (7th June 1944) and describes in detail the

campaign lasting up to the end of August when the Falaise pocket was closed on 20th August "trapping more than 50,000 German troops, destroying an additional 10,000 and sending the Fifth Panzer and Seventh Armies reclining eastward across the Seine in defeat." This defeat of Germany in Normandy was followed on the 25th August by the liberation of Paris by a Franco-American force. The casualties of the Germans in these three months of fighting amounted to over 300,000, while the Allied ground forces, in spite of being on the offensive, had only 209,672 casualties (including 36,976 killed).

Both the authors of this volume took part in the campaign, and they have made a remarkable use of their own experiences as well as of German and Allied eye-witness accounts. The authors while bringing out clearly the causes of the Allied success, have also explained and criticised controversial issues of the campaign and the differences in the Anglo-American camp. This objectivity adds to the value of the book. In addition there are twelve pages of maps and 28 photographs from Allied and German sources to illuminate the story. It is a well-written account of the beginning of the end of Hitler's stranglehold over Europe and is a significant contribution to the ever-increasing literature of the Second World War.

P.N.K.

### THE ALGERIAN INSURRECTION 1959-62

by Edgar O'Ballance

(Published by Faber and Faber, London) Pp. 231 Price 36s.

Major Edgar O'Ballance has already produced a number of books on the irregular operations undertaken in Malaya, Cyprus, China and Indo-China besides other military subjects but the present work on the Algerian insurrection is outstanding. In his lucid and unimitable style he has posed the background of the issues involved and then described the progress of the eight-year-old operations in such a manner that the whole presents a compact picture. What strikes one after reading the treatise on such irregular types of operations undertaken against established authority, is the heavy expense of national resources and the heavy loss of life and property in them. Against the background of the tremendous scientific advance made during the 1939-45 war that have contributed greatly to human welfare and also given new concepts to national strategy, those operations that have now become the order of the day, have contributed nothing to boast of—in the scientific field or promoting the art of war. All the literature attempts by direct or indirect methods to further the concept of such types of warfare of Mao Tse-tung mainly and a few others.

The methods employed by the Chinese communists may have succeeded in the end but one forgets the time taken and the heavy loss of life and property which were a national waste and can never be justified on the grounds of results achieved. Like the Communist Chinese we Indians too, have had a long drawn-out struggle for similar ends. It is worth giving it a thought—the justification and efficacy of violent methods as against non-violent ones.

The Algerian insurrection is an interesting subject of study. It started off like all others but soon gained momentum. The countries on the borders gave active support in the form of training grounds, services and equipment. The formation of an 'Algerian Government in exile', the provision of ample funds for fighting the political battle and then its international recognition at the level of the United Nations was no mean achievement. The issues became complicated with the French army taking sides both against the insurrectionaries and the French Government. There was heavy loss of life and property and the high praise given to General de Gaulle in settling the issues is well deserved. The book is well produced.

G.S.

### GALLIPOLI, THE FADING VISION

by John North,

(Published by Faber and Faber, London).

This is a paper cover cheap edition of a standard book on the subject, first published many years ago. The Gallipoli Campaign of 1915 has been described by a critic as a story of "muddle, mismanagement and sacrifice". This judgement may be too harsh, but even John North, the author of the book under review, agrees that it was the story of "our most disastrous failure in arms: a failure which for some queer trait in their character, the British people continue to celebrate."

The campaign arose out of the decision of the Allies, early in 1915, to capture Constantinople, the capital of the Turkish empire. This was an extraordinarily difficult thing to do for reasons of topography, but it was thought that if the Allies could control the Dardanelles and the Bosphorus they could secure a connection with Russia through the Black Sea and thereby send aid to that hard-pressed ally. The capture of Constantinople might also have a sobering effect on Turkey, which might sue for peace or at least be put on the defensive. Strategically, Constantinople was thus a very desirable objective.

In February-March, an attempt was, therefore, made to force the Dardanelles. A combined British and French fleet penetrated the channel as far as "the Narrows", and bombarded forts on the shores. But the shores were strongly fortified. In the shores Vs ships battle, the latter suffered heavily.

This failure of the Allies caused them a serious loss of prestige, but they next thought of securing their objective by a land attack on Constantinople through the Gallipoli peninsula. It was doubted whether the operation was feasible, but Mr. Winston Churchill, who was then the First Lord of the Admiralty, was persuaded that it was. But although the responsibility for inaugurating the campaign was his, his personal responsibility as First Lord ceased within a month and a day of the first landing of the troops on the scene of operations.

Anglo-French troops, reinforced by Australian and New Zealanders (Anzacs) landed in April on the Peninsula under Sir Ian Hamilton's Command and the campaign began. The Turks had had a warning of

the well-advertised campaign and had prepared themselves under the able guidance of a German general to meet the attack. The landing was opposed but was secured after heavy casualties. A flanking movement from Suvla Bay also proved fruitless. Nevertheless the Allies held on to their precarious foothold and withdraw only in December 1915 but without accomplishing anything.

The failure of the Gallipoli campaign had a disastrous effect on British prestige in the Balkans, and influenced the Bulgars to enter the war on the side of Germany and Turkey in the autumn of 1915.

The author has described the campaign in graphic detail, and has tried to prove that modern warfare is a scientific operation to be carried out on business lines. He contrasts the sufferings and the heroism of the 'simple soldier' with the almost superhuman inadequacy of political and military leaders of the time, particularly on the home front. One can realise how powerfully he feels for the simple soldier when he wonders how the politicians "escape being strung on lampposts when the soldiers get back from the war." (p. 33)

While describing the inadequate supply arrangements and medical cover he writes, "a man had three foes to fight—the enemy, the lack of water and dysentery."

Gallipoli was a typical soldiers' campaign, and it was in the initial stages of this that the First Battalion the Lancashire Fusiliers won six Victoria crosses in one morning within a matter of a few hours before breakfast, and six more were won by the Navy before nightfall in the same day (25th April). Although the results were negative, the heroism displayed by soldiers of all arms endows the campaign with ample justification for being celebrated.

P.N.K.

### "MARITIME STRATEGY"—A STUDY OF BRITISH DEFENCE PROBLEMS

by Vice Admiral Sir Peter Gretton

(Published by Cassell, London; 1965). Price 36s.

Have navies any real role today or are they expensive relics of the past with no true function? Are the principles of Maritime Strategy still valid in the nuclear age? These and other searching questions have been posed by the author; he gives the answers in simple but incisive language, logically argued and convincingly concluded.

He makes a historical survey of strategic thought from 1914 to 1945, and enunciates the principles of maritime strategy which have been evolved through these three decades. Following these general strategic considerations, he analyses, with distinction, the peacetime and wartime principles of maritime strategy applicable to Britain.

At the outset he has conceded that in the event of a nuclear holocaust, the possibility of being able to exercise any degree of sea power is remote. In other words, under a general nuclear war he is firmly of the view that no maritime strategy is possible. But in the context of the present strategic

nuclear stalemate, it is limited wars, or the "brush fire" war, which may require to be fought by belligerent nations, or wars of intervention by UN forces. It is this type of war that Britain should be prepared to face along with her allies, and to fight such a war, with or without tactical nuclear weapons, a sound maritime strategy should be evolved. He does some crystal gazing on the type of future limited wars at sea.

He attempts an analysis of the threat to NATO countries from USSR and makes a quick survey of maritime threat from communist and pro-communist countries of the world.

While lamenting the loss of bases in the East, he advocates a base in Western Australia. He goes on to substantiate the use of aircraft carriers with the whole complex of afloat defence backed by an adequate "fleet train" for logistic support, for operation as a "mobile base", particularly because he visualises still further curtailment of overseas bases owing to "the world passing through a phase of extreme nationalism."

He extols the soundness of the convoy system in a conventional war, but concedes its disadvantage in a thermonuclear exchange, as in any case in the latter type of war, maintenance of sea communications is rendered impossible.

He thus develops his theory that a maritime strategy is a necessity, although "the atomic age is with us". If sanity is to prevail, it is possible for "the leaders of the world, be they American, Russian or Chinese...not to seek to destroy mankind and consequently there must be a stable nuclear stalemate." He concludes that mobile military power, whether wielded by the United Nations, by treaty organizations or by individual states, will be needed to prevent instability in the war-torn world of to-day, and that the sea is "the most effective medium of wielding that mobile power" in a limited war.

A book, succinctly written in the style of a serviceman, well worth a study by laymen, strategists and naval officers alike.

K.S.

### **"DREADNOUGHT"—A HISTORY OF THE MODERN BATTLESHIP**

by Richard Hough

(Published by Michael Joseph, London; 1965). Pp. 267, Price 70s.

The evolution in ship-building, a continuous process in an advancing world, is at all times a stimulating study. The author, a naval critic of repute, traces with altruistic accuracy the renaissance of the Dreadnought age.

The highly controversial discussions on the usefulness of a capital warship with all-big-guns and the abolition of secondary armament, the radical change in marine propulsion from coal-fired reciprocating engines to oil-fired steam turbines, the accent on high speed for tactical manoeuvrability and the emphasis on underwater armour plating—all form a coherent story in the maddening race for supremacy of the sea. A Dreadnought fever in which leading maritime nations—Britain, Germany, Russia,



Italy, Japan, America and France—were all inextricably involved is related in a stirring manner.

The “ideal” Dreadnought, brilliantly conceived by the Italian engineer, Vittorio Cuniberti, vigorously adopted, despite opposition, by the British Admiral, Sir John Fisher, and cleverly varied by other nations, took to sea in the Edwardian era as an extravagant monster and earned the slogan. “Fear God and Dreadnought.”

Still the controversy raged on both sides of the Atlantic. Alfred Thayer Mahan, the distinguished naval authority on sea power, fired “a massive broadside against the Dreadnought principle”. Eventually, however, Cuniberti’s theories prevailed over Mahan’s and the first American Dreadnought, the Michigan, was completed three years after the British version and two months before the German Nassau.

The Battle of Jutland was the first ever war in which the British and the German Dreadnoughts came face to face. The opposing Dreadnoughts of *Jellicoe’s* and Scheer’s were not fully committed to battle due to the “cult of caution”, born out of a “deeply held conviction that the disaster or defeat must always be greater than the rewards of victory.”

The precious Dreadnoughts had to be preserved at all costs; they became a mere show of strength—a fleet in being—and for this reason alone nations maintained them. The Dreadnoughts, the first of the type constructed in 1906, continued to be built till as late as 1940s, 178 of them in all, the weight of broadside steadily increasing during all these years from 6800 lbs to as much as 28,000 lbs, the calibre of guns ranging from 12 to 18 inches and the ship herself increasing in dimensions, with displacement rising from 18,000 to 69,000 tons. This enormous growth was halted, temporarily during the 10 year “Battleship Holiday” in the twenties, and for good in the forties, as in the history of any other weapon of war, the advancement of science had made its predecessor in the line obsolete. C.S. Forester in his Introduction to the book concludes: “The day of the Dreadnought was passing, but the evening of that day was long drawn out. Through the endless Pacific campaigns the Dreadnought learned to subordinate her role to the Carrier’s. The Dreadnought was no longer the queen of the seas, but proved to be worthy helpmate to the new queen.”

The story is well told, well presented, abundantly illustrated with photographs, and the book carries at the end a table of “characteristics of capital ships” and an exhaustive index. The book would prove a useful addition to any naval library.

K.S.

## NAGALAND IN TRANSITION

by Major V.K. Anand

(Published by Associated Publishing House, New Delhi). Rs. 18.00.

Nagaland has been very much in the news after 1947, and though we in the rest of India occasionally read something about the political developments there now and then, we hardly have any clear idea of the land

and the people and their recent history. Major Anand who served in Nagaland during the fifties, a period of transition, has done a great service in bringing out this book, based on his personal observations to fill the gap in our knowledge. The main interest and value of Major Anand's book lies in the authentic glimpses it provides of the daily life of the Nagas and their customs. There is clarity and individuality in the description particularly in those chapters which are written in the first person singular in a sort of auto-biographical vein. This gives depth to the work and the images which the author creates. His observations about "those wonderful people" disclose a sympathetic nature which helps him to convey successfully the atmosphere of the Naga village the activities and habits of the people including those of women and children and the changes through which they have passed in recent times. He describes the Naga people as 'sweet and charming' and though one feels that his description is, at places, somewhat sentimental and a bit exaggerated, it is not untrue. The author, himself an engineer, has a very high opinion of the Naga's expert use of the *dao* for clearing the jungle and their ingenious method of making strong suspension bridges out of cane—"the hanging bridges are the most fascinating feat of engineering."

The chapter entitled "Those Bygone Days" is historical and records briefly not only the pre-1947 history but also the momentous events and political developments of the post-Independence period. This certainly adds to the value of the book.

Some of the other interesting chapters are 'Love and Marriage', 'Discipline and Democracy', 'The fight for Skulls', 'Ideas and Beliefs' and from 'Darkness to Light.'

One shortcoming may, however, be pointed out—there are no photographs or illustrations. That aside, the book is a must for all those who wish to be well informed and up to date on this problem state which, incidentally, is the only Indian state having English as its official regional language.

P.N.K.

## AROUND THE WORLD ON A NICKEL

by Jimmy Bedford]

(Published by Associated Publishing House, New Delhi; 1967) Pp. 314. Rs. 30.00.

Jimmy Bedford gave up the comfort and security of a good job of a Journalism Instructor at the University of Kansas and ventured into the unknown—to learn how the world lives. He visited fifty countries and five continents at a net cost of a "Nickle" (the common name for the American five cents coin). It is a simple narrative of the things he saw, the people he met and the ideas and living habits that impressed him most. The author was barely able to exist during his two years' world tour and his poverty helped him to meet common people on their level and incidentally enabled him to lose 80 lbs of excess weight.

His first leg of the journey was across the Atlantic Ocean. He earned \$ 215 during the trip by working as a photographer on board and taking pictures of passengers, while they were allowed to steer the ship, including

those of 'girls' of seventy with 'boy friends' and 'wolves' of the same age group. In England, the author experienced the feeling of human warmth and friendliness coupled with a certain modicum of reserve. However, he felt that Britain's system of money, measurement, dress and diet was eccentric and puts her out of step with the rest of the world. He writes about his visit to Sherwood forest where Robin Hood roamed with his gang 600 years ago. His Sunday pictorial assignments included taking pictures of bald heads, babies, nurses, of women who wore mink coats and diamond tiara while washing dishes.

"Go home Yank" was a greeting which the author fully expected on the continent, but he received instead greetings of "Come home with us, Yank". His trip to Sweden and Norway was interesting as well as adventurous. He was impressed with the German industry and quality of products. In "Sunny Italia", every time he had to write to any Government Agency, he had to buy a sheet of paper with a revenue stamp on it, but was amply compensated in the city of Romulus and Rhemus by eating many a good meal at 15 cents each in government subsidized restaurants!

He entered Africa on a "Galloping Beast", (as the Bushman calls a scooter). But even the "Galloping Beast" could not help the author to realise his dream of visiting Timbuktu because the last bit of the so-called road would have been an un-surmountable obstacle course even for a 'Sherman tank'. However, he was welcomed almost everywhere and by everyone on the vast African mainland except by his own countrymen employed in the American Consulates and Embassies, who were always helpless because they did not want their mighty government to be committed to helping a 'vagabond' citizen in distress. His sojourn with the pigmies in Ituri forest is interesting as well as revealing. In the land of Solomon and Sheba, the author stayed in an Adis Ababa hotel for 40 cents a night for a room 'WITH'. But, alas! it were only the nth female descendants of the Queen, who forced their way into the 40 cent rooms after midnight to provide hotel guests with a "better night's sleep". Before entering Egypt, the author was warned that "these Arabs will steal the scooter out from under you while you are driving 60 miles an hour". However, many times when the scooter was not under him, he was only enjoying the proverbial Arabian hospitality.

In India, he found that the South Indian 'docie' was delicious while 'idly' was "not so good", in spite of which he had many a hearty meal in Madras for 10 cents each to keep his body and soul together. About India, in general, the author has this to say—

*"Oh, ye land of philosophy and home of the religions, sanctum of beggars and haven for animals, with all your faults, I love you."*

For millions of people, who dream of trips round the world but who are unable to do it, the book brings a warm feeling of having travelled along with the author; and for those young men and women who one day may follow a similar path it offers great encouragement. To all, who read the book, it is a rewarding experience.

# SECRETARY'S NOTES

## ANNUAL SUBSCRIPTION

I would like to thank all those members who paid their subscription so promptly at the beginning of the year. To those of you who have not yet paid, may I remind you that your subscription was due on the 1st January. Would you please, therefore, put a cheque in the post to me TODAY.

## CHANGES OF ADDRESS

Several cases of non receipt of Journals have been reported due to members not informing the Secretary of their changes of address. Members are requested to inform this office promptly whenever there is a change of address.

## NEW MEMBERS

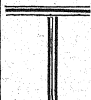
From 1st July 1967 to 30th September 1967, the following new members joined the Institution:—

AMARJIT SINGH, Major	DEEPAK MEHRA, 2/Lieut.
ANAND, Major K.P., Engineers	DHADWAL, Major D.S.
ANAND, Major R.K.	DHARAM VIR, Major
ARJUN SINGH, Captain	DOGRA, Major G.K.
ASHOK JOSHI, Major	DOGRA, Major S.C.
AULAKH, Major S.S., A.S.C.	ETHIRAJULU, Captain V.
AURORA, Major A.K., The Dogra Regiment	GANESH, Major D.K.
BAGGA, Major R.K., E.M.E.	GARG, Captain S.C.
BAINS, Major A.S.	GHARPURI, Major M.W., Artillery
BAJAJ, Major G.S., Artillery	GINWALA, Major S.N., Artillery
BASU, Captain S.P., Engineers	GRACIAS, Lt.-Col. C.I.P.
BUDHWAR, Captain R.C.	GUPTA, Major P.K., Gorkha Regt (Life)
CHATURVEDI, Major K.K.	GUPTA, Major S.K.
CHAUDHRY, Major I.M., Engineers	HAJARE, Major J.S., Artillery
CHAUDHARY, Major H.S., Artillery	HASAN MUZAFFAR, Major, Engineers
CHAUHAN, Major A.P.S., Engineers	HOSHIAR SINGH, Major, The Dogra Regt.
CHHETTRI, Major B.S.	
CHOPRA, Major O.P., A.S.C.	
CHOPRA, Major P.R., 2 Lancers (GH)	JAGAT JOSHI, Major, Sikh L.I.
CHOPRA, Captain V.M.	JOGINDER SINGH SETHI, 2/Lieut., The Punjab Regt.
CHOPRA, Captain Y.P.	
DAS GUPTA, Major A.K., Engineers	KAILASAM, Major V.
DALEEP SINGH, Major, Artillery	KALA, Captain M.M.P.

- KAPUR, Major K.C., E.M.E. (Life)  
 KAPUR, Major P.K.D.  
 KATOCH, Major P.C., The Rajputana Rifles  
 KESHAR SINGH, Major, 2 Scouts  
 KHANNA, Major R.K., The Kumaon Regiment  
 KHANNA, Major D.P., Engineers  
 KOCHHAR, Major A.K., Vr. C., Artillery  
 KRISHNAN, Major C.S., Vr. C.  
 KRISHNAN IYER, Captain C.V.K., The Dogra Regiment  
 KRISHNASWAMI, Major A.  
 KULJIT SINGH, Major, Engineers  
 KUNDAN LAL, Major, Engineers  
 LAJ SALDANHA, Major, Artillery  
 LANGAR, Major R.K., Artillery  
 MAHAJAN, Major V.K., Singals  
 MALHOTRA, Major A.K., A.S.C.  
 MAMAK, Major J.S.  
 MANJIT SINGH PAINTAL, Captain, 2nd Lancers  
 MARWAHA, Major N.L., The Jat Regiment  
 MATHEW, Captain A.M.  
 MODGIL, Major R.S., Artillery  
 MULTANI, Major S.S., The Punjab Regiment  
 MUTHANNA, Major K.M., The Guards  
 NARINDER NATH, Major  
 NARIJINDAR SINGH, Major  
 NIHALANI, Major R.N.  
 NIRMAL SARKAR, Major, A.S.C.  
 PANDE, Major A.S.  
 PERMINDER SINGH, Major, E.M.E. (Life)  
 PHAGURA, Major R.S., Artillery  
 PHILIPS, Captain C.C., A.O.C.  
 POHKAR SINGH, Captain  
 PRAMOD PAREEK, Major, The Rajputana Rifles  
 PREM KUMAR, Major, The Kumaon Regiment  
 PREM SINGH, Major, The Mahar Regiment  
 RAJPAL, Major G.L.  
 RATTAN, Major A.S., The JAK Rifles  
 RATRA, Major R.S., The Gorkha Rifles  
 RAO, Major J.S., Engineers  
 RAVIKANT, Major S.K., Artillery  
 SANDHU, Major A.S.  
 SANDHU, Major B.S.  
 SEGHAL, Captain P.N.  
 SETH, Captain J.L., The Parachute Regiment  
 SETHI, Major S.S., Artillery  
 SETHURAMAN, Major K.R.  
 SHAKTI SINGH, Major  
 SHER SINGH, Major The Grendiers  
 SIKKA, Major S.K., Signals  
 SINGH, Captain B.R.  
 SINGH, Major D.V. The Kumaon Regiment  
 SINGH, Major R.D.  
 SINGH, Captain R.K., A.O.C.  
 SHARMA, Major J.L.  
 SHARMA, Sqn. Ldr. M.M., I.A.F. (Life)  
 SONPAR, Major S.K., Vr. C. 63 Cavalry  
 SRIVASTAVA, Major N.L.  
 SRIVASTAVA, Major P.P., Engineers  
 SURENDRA KUMAR, Lt. Col., Engineers  
 SURRINDER KUMAR, Major, Artillery  
 SURRINDER SINGH, Major  
 SURJIT SINGH, Major  
 SURJIT SINGH MANAISE, Major, Artillery  
 THAKRAL, Major C.P., The Sikh Regiment

TEK CHAND, Lieut.	Regiment
THIAGARAJAN, Major R., Signals	VARMA, Captain B.R.
	VERMA, Major M.L. Artillery
UPADHYAY, Major K.D., The Mahar	VERMA, Major R.K., Artillery
Regiment	VERMA, Major S.K.
UPRETI, Major K.C.	YASH SEGHAL, 2/Lieut., The Dogra
VADEHRA, Major Y.K., The Mahar	Regiment (Life)

Seven officers messes and institutions were enrolled as subscribing members during this period.

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THIAGARAJAN, Major R., Signals	VARMA, Captain B.R.
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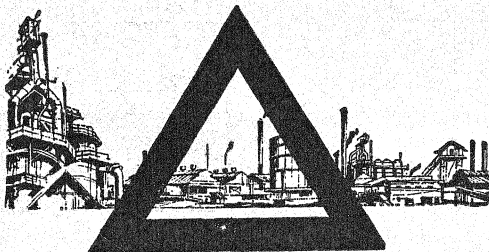
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## AT JAMSHEDPUR, SAFETY IS PART OF THE JOB

Seventy-five per cent of industrial accidents, it has been found from experience, are avoidable because they are *caused* by human negligence. That is why at Tata Steel much stress is laid on the systematic safety education for each worker.

One of the first things that an entrant to the Steel Works has to undergo is a safety induction course. The lesson thus begun is pursued through a continuing campaign. Regular inspection of shop-floors, good house-keeping, use of safety appliances, combined with the activities of the ever-vigilant safety committees, are helping to root out possible sources of hazards...to make working conditions safer. In addition, regular study courses, exhibitions and competitions are held to make safety a habit with every worker.

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